october 1957

nlgi spokesman

journal of the national lubricating grease institute

25th annual meeting

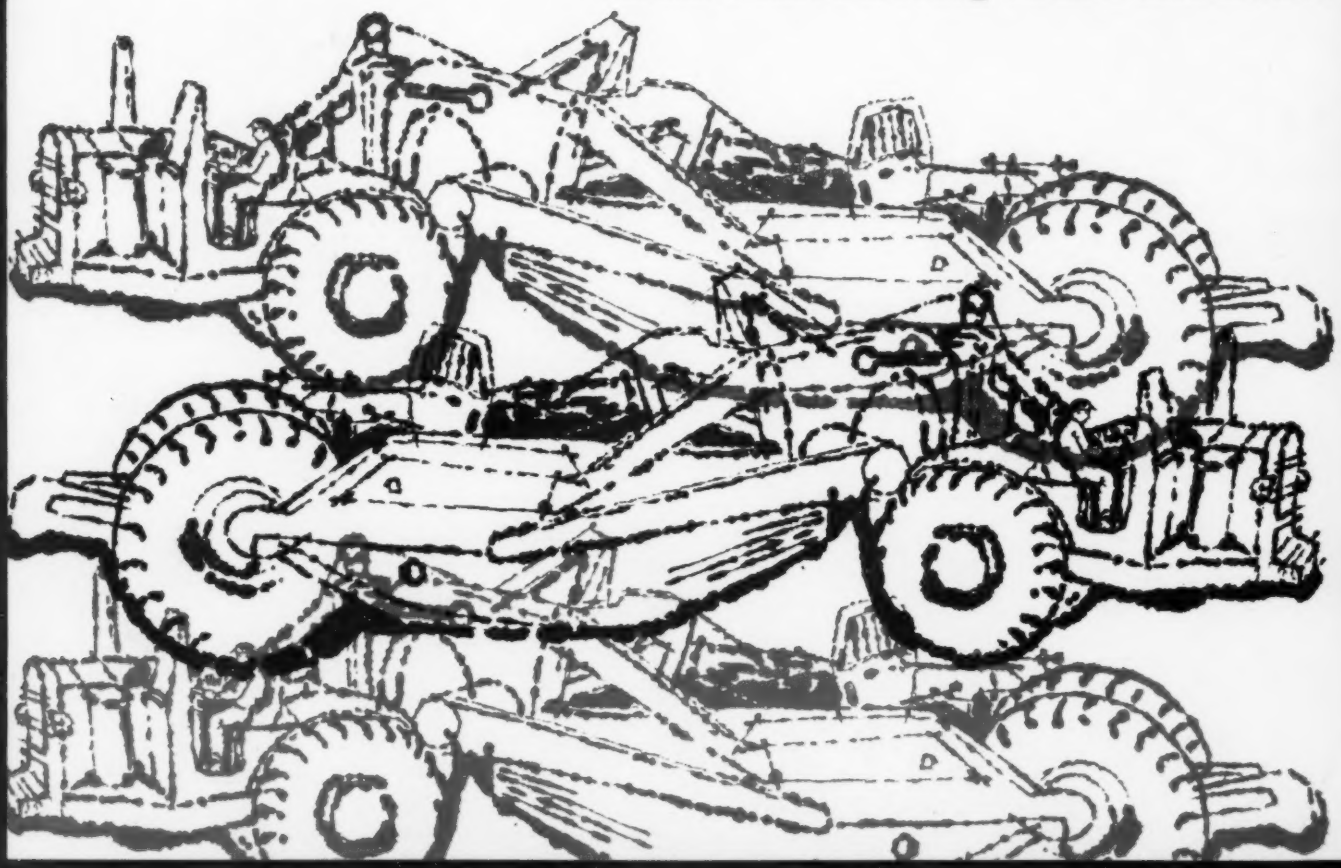
national lubricating grease institute

october 28-30, 1957

edgewater beach hotel, chicago

feature: earth-moving vehicle lubrication

NLGI '57



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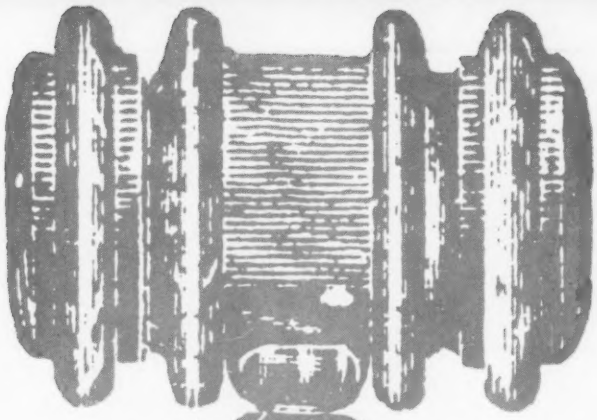


THE PRESIDENT'S PAGE

By J. W. LANE
NLGI
President

A TASK COMPLETED

There is one NLGI accomplishment for 1957 which is a source of considerable personal satisfaction. This is the completion of our moving picture, "Grease—The Magic Film." As chairman of the Moving Picture Committee since its inception, it was my pleasure and, to be perfectly candid, some times my headache, to see this important promotion project through every phase of development from the roughing out of a script to acceptance of the answer print. Of course, the burden was shared also by the Committee members, and for this I am most grateful.

The film has already been viewed by numerous people who, in every case of which I have knowledge, have been unstinting in their favorable comments regarding the script, choice of scenes and photography, as well as the over-all quality. NLGI can feel amply rewarded for having sponsored this project and underwritten a large portion of its production cost.

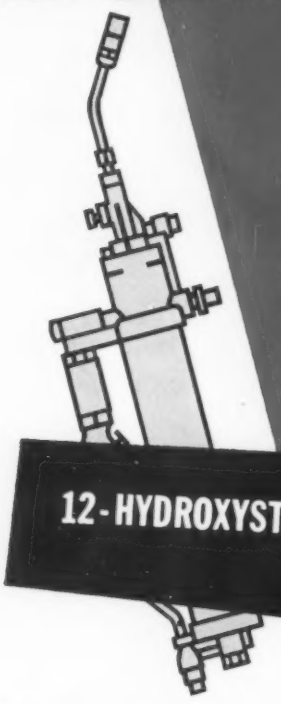
The Institute has been invited to show "Grease—The Magic Film" at a group session sponsored by the API Lubrication Committee during their annual meeting to be held in Chicago on November 11, 12 and 13. We have accepted the invitation and are pleased at the opportunity to promote NLGI and lubricating grease before such an important audience.

* * *

It is hard to believe that this is the last President's Page message which I will be privileged to address to the membership. It seems only yesterday that I was wrestling with the first one, that for the November, 1956, issue of the NLGI SPOKESMAN.

The conduct of an organization such as NLGI is a succession of mostly the little things which get done day after day. The grand accomplishments are few. The headquarters office headed by Tom Miller, executive secretary, backed up by the officers, board of directors, and various committee members, working out of their places of business, constitute the Institute's task forces. I would be exceedingly remiss if I did not take this opportunity of expressing publicly to each and every individual concerned my sincere appreciation of his help in making my tenure as president both an opportunity and a pleasure. I can only wish as much to my successor.

Baker



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nlgi spokesman

Volume XXI OCTOBER, 1957 Number 7

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THE COVER

THE earthmover — representing heavy duty contracting equipment in a variety of allied machinery of mammoth proportions, will be one feature of the NLGI 1957 Annual Meeting. At 9:00 a.m., Tuesday, October 29, a panel discussion titled "Lubrication of Contractor's Equipment" will be conducted by G. W. Krause of Battenfeld. Participants will be R. L. Nelson of S. J. Groves & Sons, T. M. Murphy of Stewart-Warner, G. K. Brower of International Harvester and D. Rosselle and R. J. Brossmann, Standard Oil (Ohio). The construction industry and NLGI will join forces to solve their common problems.

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Future Meetings

OCTOBER, 1957

1-2 Texas Mid-Continent Oil & Gas Assn. (38th annual meeting), Texas Hotel, Fort Worth.

1-5 SAE National Aeronautic Meeting, Aircraft Production Forum, and Aircraft Engineering Display, The Ambassador, Los Angeles, Calif.

6-10 ASTM Committee D-2 meeting, Sheraton-Park Hotel, Washington, D. C.

7-9 ASME, ASLE-ASME Lubrication Conference, Royal York Hotel, Toronto, Ont.

7-11 American Institute of Electrical Engineers (1957 Fall general meeting), Morrison Hotel, Chicago.

9-12 SAE National Tractor Meeting and Production Forum, Hotel Schroeder, Milwaukee, Wis.

10-12 ASME, Fuels-AIME conference, Chateau Frontenac, Quebec City, Que.

13-16 API Division of Refining (midyear meeting), Penn-Sheraton Hotel, Philadelphia.

14-16 API Division of Marketing, Operations and Engineering Committee meeting, Biltmore Hotel, Los Angeles.

16-17 Indiana Independent Petroleum Assn., Annual Meeting, Hotel Severin, Indianapolis.

16-20 API Marketing Div. Marketing Research Committee, Camelback Inn, Phoenix.

17 West Virginia Petroleum Assn., Annual Meeting, Daniel Boone Hotel, Charleston.

18 Virginia Oil Men's Assn., Hotel Roanoke, Roanoke.

20-22 Empire State Petroleum Assn., Lake Placid Club, Lake Placid.

20-22 National Assn. of Oil Equipment Jobbers, Annual Convention, Hotel Peabody, Memphis.

22-23 Nebraska Petroleum Marketers, Annual Meeting, Hotel Paxton, Omaha.

24-25 Western Petroleum Refiners Assn., Regional Technical-Industrial Relations Meeting, Rufus Garrett Hotel, El Dorado, Ark.

24-25 Western Petroleum Refiners Assn., El Dorado Area Meeting, Rufus Garrett Hotel, El Dorado, Ark.

27-29 Independent Petroleum Assn. of America, Annual Meeting, Statler-Hilton Hotel, Dallas.

28-30 Packaging Institute, 19th Annual Forum, Hotel Statler, New York City.

28-30 NLGI Annual Meeting, Edgewater Beach Hotel, Chicago, Ill.

NOVEMBER, 1957

4-6 SAE National Transportation Meeting, Hotel Statler, Cleveland, Ohio.

5-6 SAE National Diesel Engine Meeting, Hotel Statler, Cleveland, Ohio.

6-8 Society of Automotive Engineers, National Fuels and Lubricants Meeting, Hotel Statler, Cleveland, Ohio.

11 API OIC, Steering Committee Meeting, Conrad Hilton Hotel, Chicago.

11-14 API 37th Annual Meeting, Conrad Hilton and Palmer House, Chicago, Ill.

DECEMBER, 1957

1-6 ASME, annual meeting, Statler Hotel, New York City

3-4 Petroleum Packaging Committee, quarterly meeting, Hotel Washington, Washington.

FEBRUARY, 1958

2-7 ASTM Committee D-2 Meeting, Rice Hotel, Houston.

12-14 API Division of Marketing, Marketing Research Committee, Biltmore Hotel, New York City.

26-28 API Division of Production, Southern District Meeting, Shamrock-Hilton Hotel, Houston.

27-28 API Division of Marketing, Lubrication Committee Meeting, Sheraton-Cadillac Hotel, Detroit.

MARCH, 1958

4-6 SAE Passenger Car, Body and Materials Meeting, Sheraton-Cadillac, Detroit, Mich.

31-Apr. 2 SAE National Production Meeting and Forum, The Drake, Chicago, Ill.

APRIL, 1958

9-11 API Division of Production, Mid-Continent District Meeting, Biltmore Hotel, Oklahoma City.

16-18 National Petroleum Association, Cleveland, Ohio

MAY, 1958

21-23 API Division of Marketing, Midyear Meeting, Roosevelt Hotel, New Orleans

22-23 API Division of Production, Pacific Coast District Meeting, Biltmore Hotel, Los Angeles.

JUNE, 1958

8-13 API Division of Production, Midyear Committee Conference, Hollywood Beach Hotel, Hollywood, Fla.

8-13 SAE Summer Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

22-28 ASTM 61st Annual Meeting, Hotel Statler, Boston, Mass.

SEPTEMBER, 1958

10-12 National Petroleum Association, Atlantic City, N. J.

OCTOBER, 1958

20-22 SAE National Transportation Meeting, Lord Baltimore Hotel, Baltimore, Md.

22-24 SAE National Diesel Engine Meeting, Lord Baltimore Hotel, Baltimore, Md.

27-29 NLGI Annual Meeting, Edgewater Beach Hotel, Chicago, Ill.

NOVEMBER, 1958

5-6 SAE National Fuels and Lubricants Meeting, The Mayo, Tulsa, Okla.

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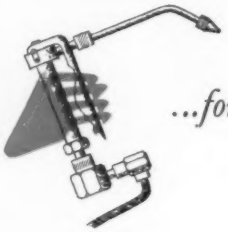

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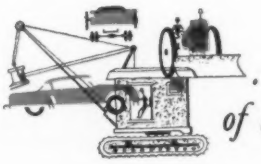

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News About NLGI

Industry Survey Sanctioned By Board

In response to overwhelming approval expressed by the Active membership of the National Lubricating Grease Institute, a committee investigating the possibilities of beginning a grease lubricating production survey made a unanimous recommendation to the Board of Directors at their September 9 meeting that such a service be instigated by NLGI. The Board of Directors directed that this be done, beginning with production figures for the year 1957.

WHO will participate? All active member firms of NLGI in the United States will be mailed questionnaires. It was unofficially estimated earlier that firms replying their intent to participate included more than 75 per cent of domestic production.

WHAT will be asked? Production figures *only*, no breakdown of sales or distribution. Production to be given in actual pounds.

WHERE is the survey being computed? The management services division in the Kansas City office of the national accounting firm of Ernst and Ernst was selected by the NLGI Board of Directors as the organization best suited to handle the statistics. Because of the confidential nature of the replies and since Ernst & Ernst has a nation-wide reputation for reliability based on survey work for other organizations, all questionnaires and replies will eminate and be directed to this agency. At the conclusion of the survey the national office of NLGI will be afforded a total, and a statement that the intent to honor all confidential material has been kept. No one connected with NLGI in any fashion will have access to these records.

WHEN does the survey begin? Immediately upon receipt of correspondence, from the gathering agency—probably in December of this year. Replies should be sent to the Kansas City office of Ernst and Ernst on or before January 31, 1958. Immediately upon receipt of the total results from Ernst & Ernst, the NLGI national office will make the figures available to the membership.

WHY is this survey being taken? To meet a great need as expressed by the majority of the NLGI membership, to establish sales and production trends to give each firm perspective, to show past history and project future developments, to aid suppliers of raw materials and containers, etc.

The National Lubricating Grease Institute will then publish the consolidated data and make them widely available to governmental and industrial agencies. The immediate value of these figures is apparent; the value in the future of the survey service looms immeasurably.

Back Issues of Bound Volumes Wanted

Quite a few requests for past issues of NLGI SPOKESMAN bound volumes have been received in the national office—demand for these books ranges back to volume one in 1937. The national office will be glad to purchase unbroken sets in good condition or to arrange for correspondence between purchaser and owner, in an effort to serve members desiring a complete file of these reference works.

Currently, firms wishing to have their back issues in volume form may purchase volumes XVIII and XIX—these are still available from NLGI in limited quantities while volume XX was offered in April. The twelve complete issues of each bound volume are contained in a handsome, durable book cover die-stamped with gold lettering.

SERVICE AIDS

- **NLGI MOVIE—"Grease, the Magic Film," a 16-mm sound movie in color running about 25 minutes, now released. First print $600, second print $400, third and subsequent orders $200.**
- **VOLUME XX—Bound volume of the NLGI SPOKESMAN from April, 1956 through March, 1957. An excellent reference source, sturdily bound in a handsome green cover . . . $7.00 (NLGI member price) and $10.00 (nonmember) plus postage.**
- **BONER'S BOOK—Manufacture and Application of Lubricating Greases, by C. J. Boner. This giant, 982-page book with 23 chapters dealing with every phase of lubricating greases is a must for everyone who uses, manufactures or sells grease lubricants. A great deal of practical value. $18.50, prepaid.**

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SCENES like these will be repeated again in October, when the 25th NLGI Annual Meeting convenes in Chicago, for a valuable and informative session by experts on lubricating grease and highway construction.

Previews . . . 25th

NLGI ANNUAL MEETING

Edgewater Beach Chicago October 28-30

A SILVER ANNIVERSARY celebration will begin with the 25th Annual Meeting of the National Lubricating Grease Institute, when the organization's quarter-century is observed. A program of particular interest will be offered, including a panel for road building in connection with the Federal highway building, a symposium on fundamental and practical aspects of bleeding of lubricating greases, a new look at sales and marketing aspects of lubricating greases, and the premiere performance of the new NLGI movie "Grease–the Magic Film." Friends and members of the National Lubricating Grease Institute are invited to attend what promises to be the largest annual meeting in NLGI history. Reservation cards have been circulated. Send yours and be sure to insure *your* place in the workshop sessions and lively discussions to come!

PROGRAM

Monday Morning
10 a.m.

President's Address—J. W. Lane
Life, Liberty and Property—S. Gange
Grease, the Magic Film—Movie

Monday Afternoon
2 p.m.

Panel—Selling the Magic Film Promotionally
The Mixing Efficiency of Grease Kettles
Development of Lithium Compounds
Pyrogenic Silica Thickened Greases

4:45 p.m.

Business Meeting

Tuesday Morning
9 a.m.

Panel—Lubrication of Contractor's Equipment

Tuesday Afternoon
2 p.m.

Packaging—An Essential Service
Development of Extreme High Temperature Grease
Modern Methods of Lubricant Application
New Equation for Calculating Flow of Lubricating Greases
CRC Laboratory Techniques for Determining Rust-Preventive Properties of Lubricating Greases

Wednesday Morning
9 a.m.

Symposium—Fundamental and Practical Aspects of Bleeding of Lubricating Greases.

SPEAKERS and SUBJECTS

Gange

Life, Liberty and Property

By STARY GANGE, Pacific Olive Company

STARY GANGE is a native Californian who raises oranges and olives. For the last six years he has made a hobby of public speaking on Americanism. Gange has averaged about one hundred talks a year and traveled about one hundred thousand miles a year. As vice president of the Pacific Olive company, Visalia, California, he has charge of several hundred acres of live property as well as his own property. The Pacific Olive company is one of the largest processing plants in the country. Gange is a director and past president of the Chamber of Commerce and has held district and international offices in the Kiwanis club.

Mayor

PANEL DISCUSSION— Selling the Magic Film Promotionally

Panel Chairman—H. A. MAYOR, JR., Southwest Grease & Oil Company, Inc.

Co-Speakers—O. ELLIOTT, National Sales, Inc. and J. R. HODGES, Southwest Grease & Oil Co., Inc.

H. A. MAYOR, JR. is executive vice president of Southwest Grease & Oil Company, Inc. After completing military service in World War II, Mayor joined Southwest as plant coordinator. He was elected to his present office in 1952. He is a graduate of the Oklahoma Military Academy. Mayor is a board member of NLGI, chairman of the petroleum packaging committee of the Packaging Institute and a member of SAE and the API lubrication committee.

Elliott

Hodges

O. ELLIOTT is president and general manager of National Sales, Inc. Elliott was first employed as acting advertising manager for Cessna Aircraft company and following his graduation from Wichita university was head of employee relations for Cessna for three years. Elliott was sales representative for a Wichita commercial printing company after leaving Cessna. He joined National Sales in 1948 as vice president and general manager, one year after the company was formed. Elliott was elected president of the lubricating equipment sales company in 1952. Elliott is a member of NLGI.

J. R. HODGES is sales representative for Southwest Grease & Oil Company, Inc. He received a B.S. degree from Kansas State college and then joined Sinclair Refining company as territory manager. Hodges joined Southwest in August, 1955, and after extended plant and laboratory duty, assumed responsibility for the sales of Sowesco products in an eight state midwestern area. He is a member of SAE and the Wichita Oil Men's Club.

Abstract

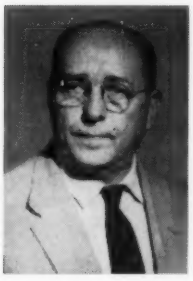
In a five-scene, sixty minute stage presentation, supported by commentary from an adjacent rostrom, a typical day-long sales meeting involving the representatives of an independent petroleum marketer and an independent grease manufacturer will be depicted. The presentation will highlight what the authors consider the most successful, important features of such a sales clinic. It will be shown how this one company

faces the problem of "Selling the Magic Film Promotionally."

Forster

Beerbower

Kolfenbach



Vesterdal

A Study of the Mixing Efficiency of Grease Kettles

By A. BEERBOWER, Esso Standard Oil Company

By E. O. FORSTER, J. J. KOLFENBACH, H. C. VESTERDAL, Esso Research & Engineering Company

E. O. FORSTER received his B.S. and Ph.D. in physical chemistry from Columbia university in 1949 and 1951, respectively. After his graduation, he joined the Esso Research and Engineering company where he is a research associate in the industrial lubricants section. He is a member of the A.C.S., Sigma Xi, A.S.M.E., and A.A.A.S

A. BEERBOWER received his B.S. in chemical engineering from the California Institute of Technology in 1935, and his M.S. in the same field from Columbia University in 1936. After his graduation, he joined the Esso Research and Engineering company (formerly Standard Oil Development company). In 1946, he transferred to Esso Standard Oil company in Baltimore, where he is presently a petroleum technologist in charge of grease and specialities development. He is a member of the American Institute of Chemical Engineers, the A.C.S., A.A.A.S., and a vice president of the Baltimore Applied Nucleonics Society.

J. J. KOLFENBACH obtained the B.A. degree from Loras college in 1939, and his Ph.D. in biophysical chemistry from Iowa State college in 1941. He has been associated with the Esso Research and Engineering company since 1944. He is presently section head of the industrial lubricants section. He is a member of A.C.S., Sigma Xi, and S.A.E.

H. G. VESTERDAL received a degree in chemical engineering from Norway's Institute of Technology. He came to the United States in 1925 and joined the products research division of the Esso Research and Engineering company. He has been active in process and product development work. He is presently a research engineer in the industrial lubricants section and is engaged in the study of grease manufacturing processes. He is a member of A.C.S. and the Norwegian American Engineering Society.

Abstract

In the manufacture of greases, it is desirable to use kettles of excellent mixing efficiency. Unfortunately, little attention has been given in the past to this phase of the manufacturing cycle. With the help of a newly-developed radioactive tracer technique, it has now become possible to evaluate the mixing efficiency of blending equipment. Using this technique, it is shown how the shape of the kettle and the paddles affect mixing ability. The effect of stirring speed and the amount of grease charged to a kettle on the mixing efficiency are determined in a quantitative fashion. The over-all efficiency of poor kettles is shown to be improved by using external circulating systems in conjunction with these kettles.

Milgram

Luckenbach

Developments in Lithium Compounds

By J. B. MILGRAM, Jr., W. F. LUCKENBACH,
R. G. VERDIECK, Foote Mineral Company

J. B. MILGRAM, JR., chemical sales engineer for Foote Mineral company, is a graduate of Polytechnic Institute, Brooklyn, New York, and the Wharton school, receiving an M.B.A. in 1952. He joined Foote a year ago and has been working exclusively on the market development of lithium chemicals. Prior to this position he was engaged in market research for Pennsalt Chemicals corporation.

W. F. LUCKENBACH, manager of chemical sales, Foote Mineral company, has been associated with lithium in grease technology since its beginnings. He is currently working to develop other uses for lithium chemicals and metal. He is a Rutgers chemistry graduate of 1937. Since 1945 Luckenbach has actively been engaged in sales and market development work. Prior to that he was research director of Foote Mineral company.

R. G. VERDIECK is manager of chemicals research at Foote Mineral company's Berwyn, Pennsylvania research laboratory. He obtained his B.S. from Regis college, Denver, in 1938 and his Ph.D. from St. Louis University in 1943. Before joining Foote in 1948 Verdieck headed the chemistry department at John Carrol university, Cleveland.

Abstract

A profile view of the various new developments in which lithium and its compounds is finding application will be given. This covers a very broad area from new agricultural fungicidal uses of lithium compounds to special additives for high energy fuels used in the missile and rockets program. Data concerning the use of lithium in electrolytic processes for the production of aluminum metal and the electrolytic deposition of bright plates such as copper, cadmium and zinc are included.

Lithium metal itself shows great promise as a coolant in extreme high temperature systems for dissipating heats such as might be encountered in missile reentry problems.

The petroleum industry was the first large industrial user of lithium and in addition to its varied uses a description is given of how widely fanned out the applications have now become.

Marsden

Pyrogenic Silica Thickened Greases

By P. B. MARSDEN, Godfrey L. Cabot, Inc.

P. B. MARSDEN is in charge of silica-thickened grease development with Godfrey L. Cabot, Inc. He took the Honours degree in chemistry at the University of London and first worked for Imperial Chemical Industries on acrylic polymers and polymerization catalysts. Coming to the United States in 1952 as technical director of Landen Putty Works, he later became president of Sealube company, manufacturers of specialty greases and protective coatings. Marsden became associated with Cabot as consultant on caulking and glazing compounds and later he was appointed to the permanent staff of the pigments applications group. Marsden is a member of ASTM, Federation of Paint, Varnish & Production clubs and NLGI.

Abstract

The relative merits of precipitated and pyrogenic silicas as grease thickeners are discussed. The considerable thickening effect of water as an additive is shown, followed by the results of the effect of higher boiling alcohols and diols. Other additives investigated were amines and pyrogenic alumina. Each of these additives was found to improve considerably one or two only of the three properties investigated: water resistance, shear stability, and consistency. For example: di-amines impart outstanding water resistance to pyrogenic silica thickened greases but do not improve their shear stability or consistency.

However, one class of additives, the poly-alkylene glycols, was found to improve all three of the properties investigated. The effect of additives of this class, in various concentrations and molecular weights, in several base oils was investigated together with the effects of pre-mixing temperature. The findings of this laboratory study were used to make several greases on production equipment.

The results of tests on these greases by an independent testing laboratory are given, and indicate that considerable improvement in the three properties investigated can be obtained by the correct choice of additives.

Krause

FORUM—Lubrication of Contractor's Equipment

Panel Chairman—G. W. KRAUSE, Battenfeld Grease & Oil Corporation

G. W. KRAUSE is vice president of research and production for Battenfeld Grease & Oil corporation. Krause graduated from Lawrence college in Wisconsin and was employed as a chemist by the Standard Oil company of Indiana. He served the company in various capacities and for twelve years was lubrication engineer, then assistant manager of lubricating and industrial sales. Krause held this position until 1953 when he became associated with a small independent grease manufacturing company as its vice president. He left the company in December of 1956 to join Battenfeld.

Nelson

Earth Moving Equipment Must Pay Off

By R. L. NELSON, S. J. Groves & Sons

R. L. NELSON is an equipment superintendent in charge of repair and maintenance operations on S. J. Groves and Sons company projects on the Ohio and Indiana toll roads and various other projects in Ohio and Michigan. Nelson has had a wealth of experience on the repair and maintenance of construction equipment during the past sixteen years, since he joined the company. Nelson graduated from Augsburg college.

Abstract

In 1954 Nelson wrote a lubrication recommendation pamphlet condensing the lubrication requirements for their equipment into six basic types of lubricants which today are recognized as standard in the construction industry. He will speak from this background of experience.

Brower

Lubricating the Construction Giants

By G. K. BROWER, International Harvester Company

G. K. BROWER is project engineer for International Harvester company in the construction equipment division, fuels and lubricants. He received his B.A. from Antioch college and his M.Sc. from the University of Pittsburgh. In 1931 he started work relating to mutual adaptation of petroleum products to mobile equipment as a fuel and oil inspector for American Airlines. The next seventeen years he served as chemist, chief chemist, manager materials and assistant director of research.

He served the company for seventeen years, attaining the position of assistant director of research. His later company affiliations include Ray Oil company where he was vice president of manufacturing, Kelite Products company, as technical director and plant manager, and the Armour Research Foundation, with the position of supervisor of special fuels and lubricants projects. Brower is a member of SAE, ASLE and ASTM.

Abstract

This paper represents the viewpoint of the manufacturer of contracting equipment. The scope consists largely of crawler tractors and a variety of allied machinery, often of mammoth proportions. Contractors equipment may be used not only in a variety of terrain and climates but also in any part of the world. Therefore, lubricating recommendation should be such that they can be followed, whatever the location of the work.

The greatest contribution of the NLGI will be in a simplification of products and recommendations. It is suggested that the construction equipment industry would like to join forces

with the NLGI for a better solution of their common problems.

It is pointed out that sound service classifications of lubricants should be set up. While mention is made that the lubricating grease industry has done an excellent job in providing satisfactory chassis, general purpose and high temperature lubricating greases, the situation with regard to tractor roller lubricants is open to improvement. This is one point on which cooperative effort is especially recommended.

It is hoped that this presentation will be the forerunner of some joint action by the two groups here represented.

Rosselle

Brossmann

The Contractors' Partner— The Lubricant Supplier

By D. J. ROSSELLE, R. J. BROSSMANN, Standard Oil Company (Ohio)

D. J. Rosselle received his B.S. degree in mechanical engineering from Michigan College of Mining and Technology. After graduation, he joined Sohio Pipeline company where he served as a division engineer and project engineer. He then joined Sohio's field engineering group where he served as a fuels and lubricants consultant to contractors and other users of heavy duty automotive equipment. In his present capacity, he is product application engineer in the Sohio sales technical division. In addition to other duties, he is actively engaged in the technical writing and employee training fields.

R. J. Brossmann is engaged as a product development engineer and also acts in an advisory capacity in product application in the Sohio sales technical division. He received his B.S. in chemistry at Wagner college and pursued his engineering education at Pratt Institute and Columbia university. He was formerly associated with Socony Mobil and has had some twenty-three years experience in grease production, machinery design and product application of all types of lubricants.

Abstract

The average highway contractor today has a multi-million dollar investment in large, highly complex, specialized equipment designed to do more work faster and with less man-power than it has ever been done before.

Lubrication of this equipment plays a vital part in the cost of operating and maintaining it. Today, many lubricant suppliers consider themselves to be the contractor's partner, and accept the responsibilities incumbent in such an arrangement.

A partnership, to be successful and endure must be profitable to both parties.

To this end, there are five keys to a successful contractor-lubricant supplier partnership—

1. The finest possible lubricant quality
2. Simplified lubrication through the use of multi-purpose products wherever possible
3. Product application information designed to get the proper lubricant in the proper place at the right time
4. Field engineering service designed to solve lubrication and other related problems
5. An adequate and prompt delivery service geared to get the lubricants on the job when and as they are needed.

With proper attention to all of these requirements, the lubricant supplier has found the keys to successfully fulfilling his obligations, and become the contractor's partner in every sense of the word, as he will have helped to reduce the cost of lubrication, minimized equipment downtime, and aided the contractor to meet his completion schedules.

Murphy

Solving Lubricant Dispensing Problems

By T. M. Murphy, Stewart-Warner Corporation

T. M. Murphy is industrial sales manager for the Alemite Division of Stewart-Warner corporation. After graduating with a B.S. from the University of Chicago, Murphy was lubrication engineer for U. S. Steel corporation for six years, and then became a salesman for the in-

dustrial lubricants section. He was with the Navy in World War II and then joined Alemite Division as a field and sales engineer.

Abstract

The subject "Better Methods of Handling and Dispensing Petroleum Products" in the construction industry is an interesting one from both economic and physical factors, when one takes into account that the construction industry uses:

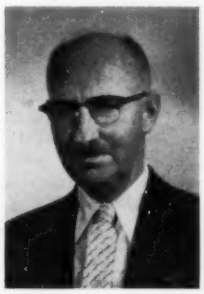
Millions of gallons of lubricating oil
Millions of pounds of lubricating grease
Millions of barrels of fuel

It is recognized that the lubricating oil and lubricating grease to fuel consumption ratio, in the construction industry, is two to three times that consumed in the automobile industry.

The problems of the contractor are many. His equipment, being mobile, is often scattered on many operations. It must frequently be operating day and night, in all kinds of weather, and sometimes under most adverse conditions.

Time, equipment, labor savings and profits are of paramount importance to the contractor. Therefore, this paper will try to carry the message as to how the contractor can solve his lubrication problems through the medium of better lubrication methods.

Armstrong



Woods

Development of an Extreme High Temperature Grease

By J. W. ARMSTRONG, H. A. WOODS, Shell Oil Co.

J. W. Armstrong graduated from Westminster college, Salt Lake City in 1951 with a B.S. in chemistry. He then served two years in the Army Chemical Corps. On discharge from the service he joined Shell Oil company at Martinez, California. Armstrong has been in the grease research section where he has been concerned with the formulation of high temperature greases. He is a member of ACS.

H. A. Woods has been associated with Shell Oil company, Martinez, California, for twenty-three years, progressing to his present position of group leader in charge of grease research. He was born on Russian Hill in San Francisco and attended the University of California, receiving his PH.G. degree in pharmacy in 1925, and his PH.C. the year following. As time permitted, Woods joined the salmon fleet in Alaska and toured extensively in Mexico. He is a member of ASLE and several ASTM and CRC committees.

Abstract

Air frame temperatures in supersonic flight are increasing to the extent that unusual lubricants are required by the accessory equipment. This need has precipitated a search for greases capable of extended operation at 450°F or higher. Grease operation in this temperature range is completely beyond the scope of the most stable soaps and petroleum oils now in use. Of the commercially available fluids only the silicones possess the desired thermal stability characteristics and although limited by lubricity deficiencies to rolling contact service these have been selected as the base fluids for this application. Grease compositions incorporating methyl phenyl polysiloxanes and a member of the anthraquinone vat dye family, have given exceptional performance at temperatures up to 500°F and show significant life at 600°F. In addition, the inert nature of this pigment has been exploited in the preparation of greases for lower temperature applications where oxidation life is a function of the stability and catalytic nature of the thickener. The article discusses performance of a family of greases of the general type described above.

Gesdorf

Modern Methods of Lubricant Application

By E J. GESDORF, The Farval Corporation

E. J. Gesdorf is a senior application engineer with the Farval Corporation. He attended Fenn college and Casi Institute of Technology. Becoming associated with Farval in 1932, Gesdorf was then engaged in the manufacture and testing of centralized lubricating equipment. Transferred to the installation department, Gesdorf spent a number of years in the field, supervising the installation of Farval centralized lubricating systems in all types of industries both in this coun-

try and in foreign countries. Gesdorf was service manager before taking his present position.

Abstract

This paper points out that the consensus of opinion indicates that the most important goals to be achieved with modern methods of lubricant application are :

a. Safety of personnel.
b. Uninterrupted production.
c. Extended machinery life.
d. Good housekeeping, and
e. A reduction in operating costs.

The day of low cost lubricants and low cost labor is gone, which has led to the increasing use of centralized lubrication. This paper will present a discussion of various types of centralized lubrication systems which will illustrate the tremendous flexibility available to satisfy specific conditions. It will also present the possibilities of electric timing and controls to protect the failure of the lubricating system as well as developments in the fields of mist or fog lubrication, gear spray lubrication, and circulating systems.

Criddle

A New Equation for Calculating Flow of Lubricating Greases

By D. W. CRIDDLE, California Research Corporation

D. W. Criddle graduated from Utah University in 1947 and served in the Navy during World War II in the field of applied electronics. He attended the University of California for graduate studies in physical chemistry and received a Ph.D. in 1950. Criddle's thesis work and his subsequent employment with California Research corporation have been in surface chemistry. His publications on gaseous adsorption, hydrocarbon chromatography, the physical properties of aqueous detergents, and the surface properties of lubricating oil additives indicate a wide and active interest in the field of surface chemistry. Recently Criddle has studied fundamentals of greases.

Abstract

A new equation is presented for relating the flow of greases in tubes to applied pressure. Unlike the Buckingham equation for a Bingham-type body, which uses two arbitrary constants to characterize the flow properties, the present equation uses only one parameter—the "yield pressure." Greases flow in tubes with a central unsheared plug. The grease flows at a rate depending on the volume fraction of the thickener, the oil viscosity, and the ratio of applied pressure to yield pressure. The equation reduces to a simplified form as follows:

$$\text{Flow Rate} = (A)(B)(C)$$

where A is the flow rate calculated for 100% base oil,
B depends on the volume fraction of the thickener, and
C is an empirical factor which depends on the ratio of applied pressure to yield pressure.

In this paper the equation is applied to 16 different flow systems. The factors B and C are calculated and presented in graphical form.

Murphy

Packaging—An Essential Service

By A. D. MURPHY, Esso Standard Oil Company

A. D. Murphy, package coordinator and chairman of the Package Advisory Committee of Standard Oil company (New Jersey) has been with the company for 40 years—twenty-eight years in the packaging activity. Murphy was the first oil man to be elected to the presidency of the Packaging Institute, Inc., a technical group dedicated to all phases of packaging. Past chairman of the Petroleum Packaging Committee and one of its founders, he has been one of the leaders in establishing universal standards for petroleum packages.

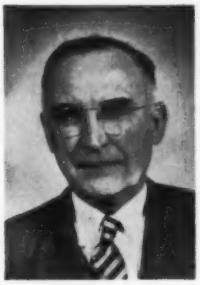
Abstract

For a period of over thirty-five years the subject of grease packages lay dormant. Metal packages varied not only between manufacturers, but between plants of the same companies. Four different dimensions and shapes were prevalent from the West Coast to East Coast on the old 100 lb. capacity grease keg. Both the filling

plants and the customers had handling difficulties and service station and industrial users were greatly confused.

A very comprehensive program under the co-sponsorship of the Steel Shipping Container Institute, the Chemical Packages Committee of the Manufacturing Chemists Association and the Petroleum Packaging Committee has been set up. Recommendations are submitted to the NLGI-API Container Committee for approval on all recommended standards. Standards for all sizes of containers have been worked on successfully. Now, for the first time, the closing ring contour, length and closing mechanism are to be studied.

Tests are being conducted for some radical changes in the future, necessitated by the rising price of steel. Some daring possibilities for future packaging to meet rising costs are presented.



Adams

CRC Laboratory Technique for Determining Rust-Preventive Properties of Lubricating Greases

By E. W. ADAMS, Standard Oil Company (Indiana)

E. W. Adams is associate director of research in the Whiting Laboratories of Standard Oil company (Indiana). After receiving a Ph.D. degree in organic chemistry from the University of Wisconsin and spending some time in the academic field as professor of chemistry, he joined the staff of his present company in 1925 as research chemist. He served in various capacities and was named to his present position in 1950. He had previously received an A.B. in education from Western Illinois State college and a B.S. and M.S. in chemistry from the University of Illinois. He is a member of Sigma Xi, ACS, and API.

Abstract

Corrosion of aircraft wheel bearings was reported as of major concern to the armed services as early as 1949. A Coordinating Research Council panel was formed and began work in 1950, to develop a method for evaluating the ability of lubricating greases to prevent corrosion. This cooperative activity by industry and government laboratories resulted in a laboratory method called "Research Technique for Determination of Rust Preventive Properties of Lubricating Greases in the Presence of Free Water" (CRC Designation L-41).

In this test clean new roller-bearing cones and cups are lubricated and stored on standard-taper glass bushings in 8-ounce glass jars for two weeks at 77°F and 100% relative humidity. After cleaning, the bearings are disassembled and examined for corrosion. Corrosion of bearing is defined as any surface damage or rusting of the raceways or rollers or any black stains thereon. Non-corroded bearings are rated 1; incipiently corroded, showing only a few small spots, 2; and all others, 3. Grease samples are run in triplicate; if two or three give the same rating (1, 2, 3), this value is reported. Otherwise, the test is repeated.

The laboratory data, supported by controlled service tests, indicate the technique readily distinguishes between greases having good and those having poor rust preventive properties. Such samples were uniformly differentiated by 90% of those making the evaluations. Precision is poorer with borderline products. The method is appearing in military specifications and is being used increasingly by industry.

Dreher

Pohorilla

SYMPOSIUM—Fundamental and Practical Aspects of Bleeding of Lubricating Greases

Chairman—J. L. DREHER, California Research Corp.

Vice-Chairman—M. J. POHORILLA, Kendall Refining Company

Summary of Research on Bleeding of Lubricating Greases by ASTM Technical Committee G-IV

Summary of Chairman B. B. FARRINGTON's report to ASTM Technical Committee G in June 1957. Presented by J. L. DREHER

J. L. Dreher is group supervisor of the grease research and development laboratory of California Research Corporation and has been an employee of the Company since 1945. He obtained his AB degree in chemistry from the University of California at Los Angeles in 1935 and

began working for General Petroleum corporation. In 1943, he joined the Metallurgical Laboratories (Manhattan Project), University of Chicago, and in 1944 was employed by Du Pont at the Hanford Engineering Works. He is a member of ACS, ASLE, and AAAS.

M. J. POHORILLA is a graduate of the university of Pennsylvania, where he received his A.B. and M.S. degrees in chemistry. He joined the department of research and development of Kendall Refining company as a research chemist in 1950, and currently supervises the activities of the chemical group.

Cortes

Tensive Stresses on Lubricating Greases Reduce Bleeding

By D. W. CRIDDLE, J. CORTES, JR., California Research Corporation

See page 20 for Criddle photo and biography

J. CORTES, JR. is in the grease and industrial lubricants division of California Research Corporation, Richmond, California. He joined the Company in 1951 and while an employee completed requirements for his AB degree at the University of California. His present assignment in the Grease Research Group includes studies of grease components by electron microscopy and physical properties of greases.

Calhoun

The Ordnance Corps Looks Into Grease Bleeding

By S. F. CALHOUN, Rock Island Arsenal

S. F. CALHOUN received a B.S. and M.S. in chemistry from Iowa Wesleyan and Iowa University. While in college he served as research assistant and did work on chlorination of fatty acids and ethanol-tetrachloride system. In 1952 he joined the research staff of Rock Island Arsenal and has worked on synthetic lubricants, oil separation and anti-oxidants. He is a member of ACS.

Aarons

Experience of Steel Mills with the Bleeding of Lubricating Greases

By J. S. AARONS, National Tube Division, U. S. Steel Corporation

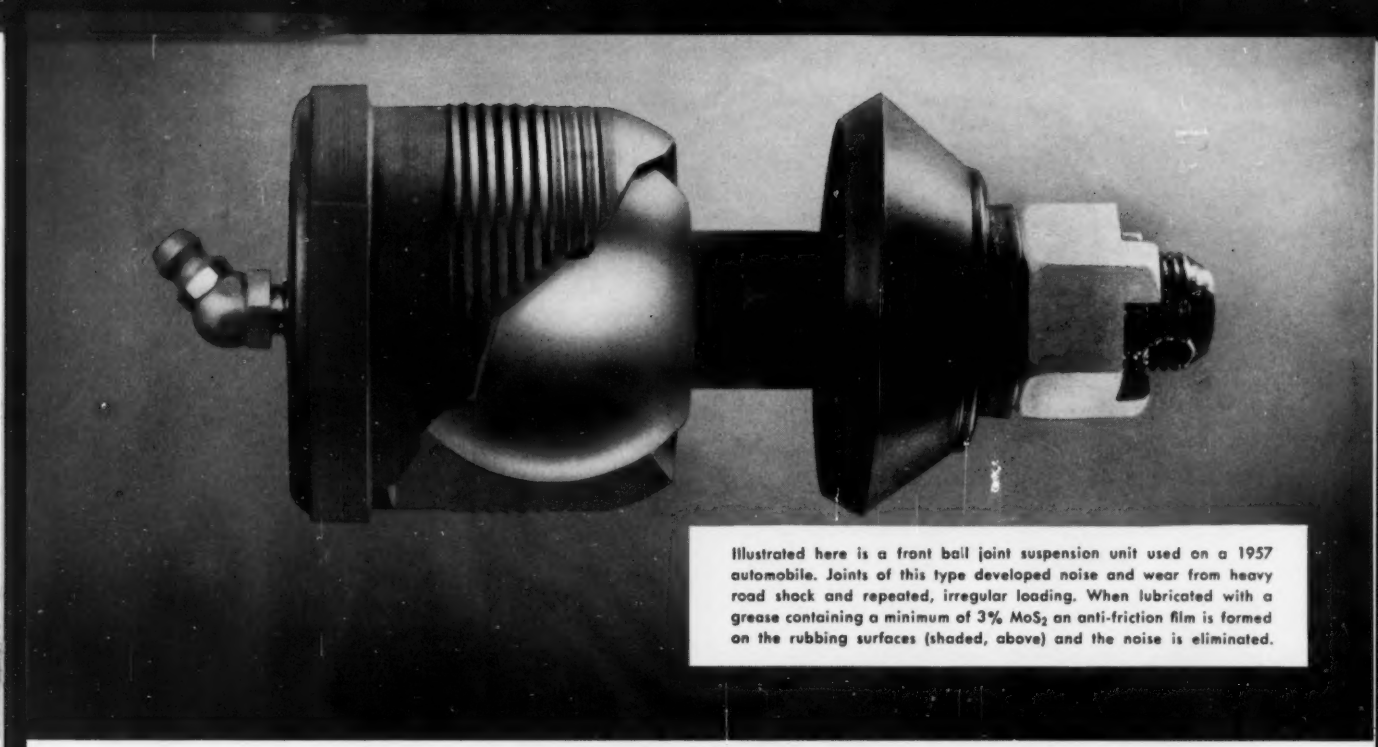
J. S. AARONS was graduated from the University of Connecticut in 1929. For the past twenty-six years, he has been an employee of U. S. Steel corporation. For fifteen years, he was engaged in chemical analysis of coal by-products materials at the Clairton Works; he has spent the past eleven years in the lubricants testing laboratory of National Tube Division.

Baker

Grease Bleeding— A Factor in Ball Bearing Performance

By A. E. BAKER, General Electric Company

A. E. BAKER graduated from Northwestern University with a B.S. in chemical engineering. His graduate work was done at Tufts college and Massachusetts Institute of Technology, after which he joined the Air Force during the war. Baker joined the Thomson Laboratory of General Electric company in 1945 as a leader of the fuels and lubricants group concerned with application, development and physical properties of lubricants. In 1956 Baker became manager of chemical engineering in the aircraft accessory turbine department. He is a member of ASLE, ASTM and MCA.



Illustrated here is a front ball joint suspension unit used on a 1957 automobile. Joints of this type developed noise and wear from heavy road shock and repeated, irregular loading. When lubricated with a grease containing a minimum of 3% MoS_2 an anti-friction film is formed on the rubbing surfaces (shaded, above) and the noise is eliminated.

When bearing surfaces are stripped of lubricants by SHOCK LOADING, OSCILLATION or RECIPROCATION...

MOLY-SULFIDE additive extends effective lubrication

Serious lubrication problems are often set up by extreme pressures, shock loading, oscillation and certain forms of reciprocating motion. Conventional lubricants may be forced out of the bearing area or wiped off the bearing surface. Then something more than a standard grease is required.

In situations of this kind, grease containing Moly-Sulfide proves its great value. MoS_2 is forced between the rubbing surfaces, adheres to the metal and forms a protective film that prevents galling, welding and fretting. The extent to which MoS_2 sustains lubrication is demonstrated by substantial reduction in wear, and is borne out by field reports from many different industries.

4 specific cases show advantages of MoS_2 for industry

Avoids splitting in steel punching. For example, while punching ⅝" holes in ½" thick hot rolled steel it was found that splitting of the plate frequently occurred between two adjacent holes, or toward the edge of the plate. This trouble, a result of heavy shock loading, was eliminated by brushing punches with lubricant containing MoS_2.

Makes excellent break-in lubricant for rocker arms. For break-in runs of engines, one of the major automobile manufacturers uses a supplemental MoS_2 grease on rocker arm pivots. The MoS_2 provides a low-friction film when the base lubricants wipe off under oscillating motion. This prevents galling and scoring of the mating surfaces.

Gives smooth travel to 4-ton grinding head. On a heavy cylindrical grinder the 4-ton head moves on the ways in a jumpy fashion, resulting in damage to the work. Use of a lubricant containing MoS_2 results in smooth, precise travel.

Serves well where lubricant cannot be resupplied. Moly-Sulfide is now widely used for lubricating such hard-to-reach points in automobiles as convertible top mechanisms, power operated windows and seat adjusters. Applied at assembly, the MoS_2 extends lubrication and greatly reduces noise and wear.

Many manufacturers now producing MoS_2 greases

Moly-Sulfide greases are available from many producers today. For a list of the manufacturers of these greases (Lu-2a) – which includes several major oil companies – and for a copy of "Molybdenum Disulfide as a Grease Additive" (Lu-17) write to Department 58, Climax Molybdenum Company, 500 Fifth Avenue, New York 36, N. Y.

to PACK — or NOT

The Effect of Packing Procedure on Wheel Bearing Performance

Introduction

THE RELUBRICATION OF front wheel bearings is an important service performed in the maintenance of automotive equipment. The lubricating grease industry, recognizing this situation, developed a common procedure to perform this operation. Consequently, a set of "Recommended Practices for Lubricating Automotive Front Wheel Bearings" was published,[1] which has since found wide acceptance in the field. However, one of the recommended practices concerning the amount of grease to be packed into the hub of the wheel still causes disagreement. The reason for such divergency of opinion may be found in the fact that insufficient data were available to prove or disprove—as the case may be—the contention that the hub should not be packed with grease. This paper provides quantitative evidence for the claim that the packing of the hub of automotive front wheels is not necessary. The results pre-

sented here provide further proof that the recommended practices are sound and deserve careful attention.

Discussion

In order to understand fully the effects of packing on wheel bearing performance, it is desirable to review briefly the main controlling factors: 1) quality of the grease, 2) the metallurgy of the bearing assembly, 3) service conditions, and 4) the quantity of the grease to be used.

The quality factors of the grease used in automotive equipment have been discussed in many papers.[2-5] In general, the grease is expected to provide adequate lubrication within the bearings themselves and should not leak past the seal onto the brake system. This leakage tendency is usually attributed to excessive softening of the grease because of poor structure stability and is accentuated by excessive water contamination, poor service conditions, or overpacking leading to overheating. The wheel bearing lubricant is also supposed to prevent rusting of all parts of the wheel bearing assembly and should minimize the occurrence of fretting corrosion in the regions where the bearings sit on the front wheel spindle.

Many investigations have been concerned with the aspects related to the servicing of wheel bearings. Proudfoot[6] summarized very adequately the most common malpractices which account for the majority of the complaints regarding wheel bearing grease performance.

While much emphasis has been put on the quality of the grease, it has been recognized that the metallurgy of the bearing assembly itself is also of great importance.[7] It has been pointed out on several occasions[2, 6] that one cannot blame only the lubricant for wheel bearing failures. Submicroscopic imperfections in the metal surface can lead to premature breakdown of the bearings. This condition, as well as the abovementioned poor maintenance practices can often be confused with inferior quality of the lubricants.

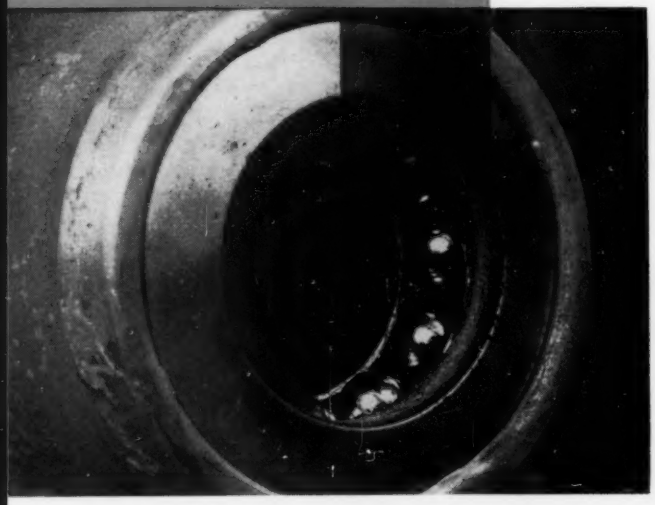
As to the amount of grease to be used in packing automotive front wheel bearings, no published data are available that would indicate the relative effectiveness of different packing procedures. In general, it is agreed that the use of excessive amounts of grease should be avoided because it may lead to serious leakage. No agreement exists, however, on the proper amount to be used in the hub. Arguments for packing grease in the hub are mainly based on the belief that the grease in the hub acts as a reservoir and provides additional lubricant to the bearings. Obviously, those recommending that no grease be packed in the hub feel that such grease does not serve any useful purpose.

Experimental Part and Results

To determine whether the NLGI recommended practice of packing no grease in the hubs assures satisfactory wheel bearing performance, field tests have been conducted in various types of automotive equipment operating under severe driving conditions. These field tests were designed to study, on a statistical basis, the effects of two different packing procedures on performance. All the data presented subsequently were obtained under carefully controlled conditions using the procedures recommended by the NLGI except for the procedures used for packing the hub.

The answer to the question whether to pack or not

to PACK



By E. O. Forster
J. J. Kolfenbach
and J. Panzer

Esso Research & Engineering Company

OPPOSITE—The three authors, Forster, Panzer and Kolfenbach inspect the packing of a front wheel bearing.

CLOSE-UP of a front wheel bearing assembly after 18,000 miles using NLGI recommended procedures for servicing.

to pack the hub was obtained from two different tests. In the first test, a qualitative comparison was made of the effect of two different packing procedures on the wheel bearing performance on heavy-duty trucks and buses. The second test was concerned with a quantitative determination of the movement of the grease packed in the hub into the bearings of passenger cars.

Four greases were used in the first test. These are listed in the following table together with their physical properties.

Table 1
PHYSICAL PROPERTIES OF TEST GREASES

GREASE:	A	B	C	D
Properties				
Soap Type	*Sodium*	*Lithium/ Calcium*	*Lithium/ Calcium*	*Calcium*
ASTM Dropping Point, °F.	393	345	325	500+
ASTM Penetration at 77°F. in mm/10				
Unworked	260	280	272	306
Worked	289	286	282	329
ASTM Wheel Bearing Test (6 Hrs. at 220°F., 660 rpm) Leakage in gms.	0	0.6	0.8	0.7
Base Oil Vis. SUS @ 210°F.	90	70	55	60

Greases B and C were of the same soap type and soap concentration but grease C was made from a base oil of lower viscosity. All four greases meet the performance requirements for wheel bearing lubricants as described in military specification MIL-G-2108.

Buses and heavy-duty trucks having tapered roller bearings were used in this first phase. The following packing procedures were used:

1. For the Bearings: Packed by hand or mechanical packer to capacity.
2. For the Hubs:
   a. Packed according to NLGI recommendations using only a light film of grease.
   b. Packed flush to the outer races with grease.

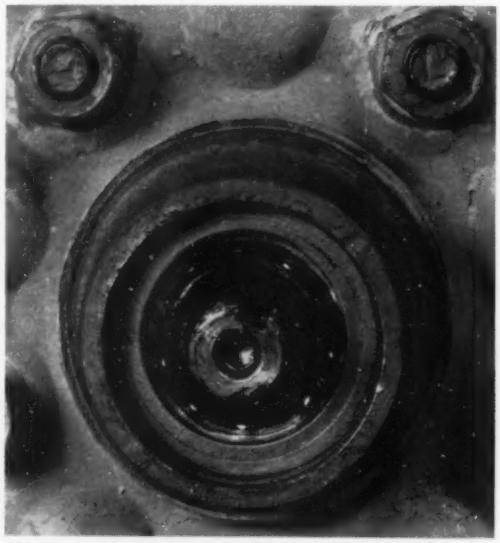
Each test unit was packed with two of the four test greases so as to provide comparisons of performance under identical conditions. The distribution of the test greases is shown in the following table.

Table 2
DISTRIBUTION OF TEST GREASES

	No. of Test Units	
Grease	*Trucks*	*Buses*
A	7	6
B	8	6
C	8	6
D	8	7

At the completion of the test, after about 15,000 miles, all wheels were inspected visually to determine the extent of leakage, fretting corrosion of the spindle, softening of the grease in the hub, and amount of grease remaining in the bearing. This last inspection was made by holding the bearing against a strong light source so as to determine if any light penetrated through the spaces between the rollers.

The results of this phase of the field tests are summarized in Table 3. The results obtained from buses and trucks were identical. Under the prevailing test conditions, no leakage of grease was observed regardless of packing. No measurable amount of wear was noticed and all bearings appeared to be in good condition at the end of the test. There was no difference in the performance of those wheel bearing assemblies which had only a light film of grease in the hub, according to NLGI recommendations, and those which had grease in the hub packed, flush to the races. The fact that those bearings packed with grease B or C



NLGI procedure serviced bearing after 18,000—lubricant should prevent rusting of all parts of assembly.

were only partially full at the end of the test did not interfere with their performance. This was evidenced from subsequent tests, in which bearings were put back in the same units without adding any new lubricant. The test units accumulated as many as 70,000 additional miles without any bearing failures. From these results, it can be concluded that the NLGI procedure provides adequate lubrication and will avoid possible difficulties which might arise from overpacking.

Once it had been established that the practice of packing no grease in the hub did not impair the wheel bearing performance, it became desirable to show quantitatively that the grease in the hub did not con-

tribute to the lubrication of the bearings. To demonstrate this point, it was reasoned that if the grease from the hub did contribute to the lubrication of the bearings, partially packed bearings would become filled with grease during the course of the test. On the other hand, if no grease was present in the hub and the bearings were packed to capacity, one might notice a considerable loss of lubricant indicating the desirability of packing grease in the hub.

Table 3

INSPECTION RESULTS OF TEST GREASES

	NLGI Packing	*Hub Packed Flush*
Rating of Grease A		
Softening in Hub	No	No
Fretting Corrosion	High	High
Amount of Grease in Bearing	Full	Full
Rating of Grease B		
Softening in Hub	No	No
Fretting Corrosion	Moderate	Moderate
Amount of Grease in Bearing	Part Full	Part Full
Rating of Grease C		
Softening in Hub	No	No
Fretting Corrosion	Moderate	Moderate
Amount of Grease in Bearing	Part Full	Part Full
Rating of Grease D		
Softening in Hub	Yes	Yes
Fretting Corrosion	None	None
Amount of Grease in Bearing	Full	Full

To test these ideas, a second phase of field tests was set up. In this phase, twelve passenger cars were used having both roller and ball bearings. Only grease B was used to lubricate these units. Half of the test units were serviced following the NLGI procedure, while the other half had their hubs packed with grease flush to the races. In the group of six test units, serviced according to NLGI recommendations, the bearings were packed as completely as possible with grease. In the other six units, in which the hubs were packed flush to the races, the bearings were packed only partially so as to permit movement of the grease into the bearing. The twelve cars were driven for over a year under city and high speed driving conditions with speeds ranging up to sixty miles per hour and accumulated about 30,000 miles per year. In the beginning and at the end of the test, the bearings were weighed so as to determine how much grease had left or entered the bearing during the test period. Also, the clean bearings were weighed before packing, and at the end of the test after a thorough cleaning to see whether any appreciable amount of wear had occurred.

The results of this phase of the field tests are summarized in the following table:

Table 4

EQUILIBRIUM DISTRIBUTION OF GREASE IN FRONT WHEEL BEARINGS OF PASSENGER CARS

	Weight of Grease (In Grams)		
Condition:	*No Grease in Hub*		*Grease in Hub*
Type of Bearings:	Ball	Roller	Ball
Inner Bearing			
at Start	8.1[1]	2.7[1]	3.0[2]
after 30,000 miles	7.1	2.6	7.2
Outer Bearing			
at Start	2.5	2.0	2.0
after 30,000 miles	2.0	2.0	2.0

[1]Average of 3 cars using same size bearings.
[2]Average of 6 cars using same size bearings.

These results indicate that some grease had migrated from the packed hub into the partially packed bearings. But when running fully packed bearings in the absence of any grease in the hub only a slight loss occurred which did not reduce appreciably the amount of grease left in the bearing. The final amount of grease in the bearing was the same as in the previous case. Apparently, there exists an "equilibrium amount" of grease for the bearing which is established during operation by throwing out excess grease or accepting additional grease. This indicates that it is perfectly safe to use the recommended NLGI procedures of packing no grease in the hub provided the bearings are properly packed.

To prove or disprove the contention that incomplete packing of the bearing in the absence of grease in the hub might lead to premature bearing failure two more passenger cars were put on test. In these units, the bearings were packed with less than the equilibrium amount of grease found in the previous phase of these tests and only a thin film of grease was packed in the hub according to the recommended

Table 5

WEIGHT OF GREASE IN FRONT WHEEL BEARINGS OF PASSENGER CARS

(No Grease in Hub)

Test Bearings	*Weight of Grease (In Grams)*	
Inner Bearing (Ball Bearing)	*Car 1*	*Car 2*
At Start	6.3	6.6
After 18,000 Miles	6.2[1]	6.5[1]
Outer Bearing (Ball Bearing)		
At Start	2.9	2.9
After 18,000 Miles	2.2[1]	2.2[1]

[1]Equilibrium amount of grease for this type of bearing is between 7.1 and 7.2 gms. for the inner bearing and between 2.0 and 2.1 gms. for the outer bearing.

NLGI procedures. The results obtained with these two units are shown in Table 5.

These results indicate that after 18,000 miles, representing half a year driving under severe service conditions, the bearings were in excellent condition in spite of incomplete packing. As anticipated from the previous results, the amount of grease in the bearing had not changed. Nevertheless, under actual operating conditions, it would be advisable to have the bearings completely packed to prevent the entrance of foreign matter such as dirt and moisture.

Conclusions

From the results obtained in these field tests, the following conclusions may be drawn:

1. The NLGI recommended practice of packing no grease in the hub of automotive wheel bearings provides satisfactory wheel bearing performance.

2. If this method is used together with the mechanical bearing packer or with careful packing of the bearings by hand, adequate bearing lubrication will prevail throughout the recommended service period provided lubricants qualified for this application are used.

3. Quantitative evidence is produced to show that under the conditions specified in 2 the bearings will establish an equilibrium amount of grease by throwing out excess lubricant, and this fact contributes to the conclusions drawn in 1 that the NLGI procedure is satisfactory and no grease beyond the thin film is necessary in the hub.

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PRESENT DAY CLEANLINESS REQUIREMENTS for INSTRUMENT BEARINGS

By T. P. Barnard

Miniature Precision Bearings, Inc.

Abstract

The purposes of this paper are twofold; (1) to show why the nature of the product, miniature instrument bearings, demands the extremes in environmental cleanliness, cleaning procedures, and purity of lubricants; (2) to describe how these ends presently are achieved at Miniature Precision Bearings, Inc.

A description of the product and the precision tolerances associated with its proper performance clearly illustrates the need for absolute cleanliness. The methods for achieving such cleanliness, at Miniature Precision Bearings, Inc., are reviewed and described. Also described are the methods and materials used to clean parts and assemblies. The problems of lubrication contamination are discussed along with solutions to the problems as arrived at by MPB.

Presented at the 1956 Coordinating Research Council Symposium

THE NECESSITY of attaining the ultimate in cleanliness of a miniature instrument ball bearing is readily appreciated when one considers its physical characteristics and the purpose for which it is intended. An instrument bearing is intended to satisfy two primary functions: (1) to locate a shaft precisely in space and (2) to permit the shaft to be turned with an absolute minimum of friction. Miniature instrument bearings, as differentiated from instrument bearings, are characterized by a difference in over-all boundary dimensions. Miniature instrument bearings are considered to be those with an outside diameter of less than three eighths of an inch. Some are as small as one tenth of an inch outside diameter and twenty-five thousandths of an inch bore.

Bearing components, that is the outer race, the inner race, balls, and in most cases a retainer, are manufactured and assembled to tolerances which are almost, but not quite, impossible. As an example, the ball com-

plement is permitted to vary in size and roundness by only ten millionths of an inch. This is a combined tolerance. In some cases this tolerance may be reduced to two millionths of an inch. The roundnesses of the outside diameters, bores, and ball grooves are held to tolerances between twenty-five and fifty millionths of an inch depending on specific requirements of the application. This tolerance includes waviness as well as roundness. The eccentricities of bore to groove and groove to outside diameter are held to tolerances of one or two ten thousandths of an inch and in some cases, less. Surface finishes, such as those on the outside diameter, and in the bore, are not permitted to exceed four to six millionths of an inch, r.m.s., and are in certain cases held to one and two millionths of an inch, r.m.s., for extremely exacting applications. The finish of the raceway, which is an intimate contact with the ball, averages less than one-half millionth of an inch, r.m.s., and in many cases is held to as low as two tenths of a millionth of an inch.

The assembled components are fitted up to radial play standards, that is internal looseness, which may vary from one ten thousandth of an inch to several ten thousandths of an inch. These extremely fine tolerances enable the bearing to fulfill its primary function of very accurate location of a shaft in space while allowing the shaft to be turned with a minimum of friction.

The critical nature of the application of these bearings necessitates functional testing to insure that they meet performance requirements. As an example, they may be functionally tested to insure that they turn, under generalized conditions of load and speed, with friction or torque levels as required for a particular application.

Many instruments are available for measuring the torque levels of instrument bearings. One device, used and developed by MPB, measures and distinguishes torque levels different by as little as twenty milligram millimeters or approximately thirty millionths of an inch ounce. Essentially, these instruments measure the torque transmitted through the balls to one race when the other race is rotated. In the most widely accepted test, for miniature bearings, the conditions require a seventy-five gram axial load on one race.

To illustrate the extreme sensitivity of these torque testing devices, picture a common house fly alighting at the end of a weightless one inch lever. Limited observations indicate the average fly weighs approximately 7.5 milligrams and exerts a torque of approximately one hundred and ninety milligram millimeters, or 264 millionths of an inch ounce, at the fulcrum of the lever. The MPB torque tester, therefore, is sensitive to increments of one tenth the weight of the fly at the end of a one inch, weighless lever.

A Description of the Facilities and Methods Used to Insure Cleanliness of Miniature Instrument Ball Bearings During Assembly and Lubrication

As an additional example, most of these miniature instrument bearings, supporting a seventy-five gram thrust load, have running torque levels (at two revolutions per minute) of four to five hundred milligram millimeters or roughly twice the turning effort of the fly at the end of the one inch lever. Expressed in inch ounces, a miniature bearing supporting a thrust load of 2.64 ounces can be rotated at two RPM by a turning effort of about five to six ten thousandths of an inch ounce.

Considering the exacting functional requirements and examples discussed above, it should not be difficult to appreciate that a microscopic particle of dirt, dust, or other foreign material in the path of the balls on the raceway would wreak havoc with the performance of an instrument bearing. Therefore, there exists a need for absolute cleanliness of miniature instrument bearings. Some of the ways and means of fulfilling this need, as employed by Miniature Precision Bearings, Inc., are the main considerations to be dealt with in this paper.

In an effort to achieve environmental cleanliness, the so-called "white room" area has gradually evolved over a period of the last ten or fifteen years. At MPB, the "white room" area is actually a building within a building. This building (within, but carefully isolated

from the rest of the plant) contains the area in which assembly, cleaning, testing, and packaging of the bearings takes place. Other facilities, which are necessary to service this area with parts, instruments, or additional operations, are also housed in the "white room" area and the same standards of cleanliness are maintained throughout.

Finished (but not assembled) components are fed to this area from the rest of the plant through a single, small window. Once in the "white room" area, parts emerge again only as completely assembled and packaged bearings.

The interior walls of this area are constructed of cement blocks over which three layers of plaster have been applied. The plastered walls are tightly sealed with a plastic wall covering which is waterproof and dust-free. No open beams, cracks, or crevices are permitted anywhere.

The floor is of cement with electrical wiring, and other facilities carried in ducts buried in the floor and accessible only through openings which are provided as necessary. The cement floor is covered with vinyl tile. A rubber dust-strip is cemented around the entire periphery of the room.

Three entrances are provided to the area. Each entrance incorporates an air lock between the inside and outside areas. The air locks are maintained at a positive pressure slightly greater than atmosphere while the inside area is maintained at a positive pressure greater than that in the air lock. Thus, air flow is always outward so that dust or other contaminants are prevented from seeping into the cleanliness controlled area. Each air lock is provided with a gelatinous mat to remove dust and dirt from the shoes of those passing through the lock. The mat is wiped down twice daily with a solvent which keeps it clean and tacky.

Personnel permanently assigned to this area, are required to enter the room through the main air lock, which is considerably larger than the two auxiliary air locks, and which is provided with an automatic shoe cleaning and brushing machine in addition to the gelatinous mat.

In the main air lock the employee dons a nylon smock and head covering before entering the controlled area. Unnecessary trips or passage through the "white room" area are discouraged. When it is necessary for personnel to leave the area, the nylon smock and cap are removed and stored in the main air lock to insure that the lint-free clothing will not be contaminated by outside environmental conditions.

Employees in this area are not permitted to use pencils, tissues, or papers of any kind, nor are they permitted to wear any woolly or linty clothing under the nylon smocks. Personnel cleanliness is a must. Bearings or components must not be touched with the bare hand, so stainless steel tweezers are provided as are lamb-skin gloves, rubber finger cots and rubber gloves.

The one exception to the foregoing rule is for very tiny components where the feel and touch of the bare hand is necessary to accomplish the assembly successfully. Bearings or parts so handled are slushed in a finger print remover which also absorbs moisture and prevents corrosion.

Work bench tops are made from sheets of formica molded to the contour of the table top. Storage cabinets are held to a minimum and are made of enamelled steel. The general scheme of the furnishings is to make the removal of dust and dirt as easy as possible and to eliminate porous material which could contribute or retain dust and dirt. Assembly and inspection operations are carried out on plastic or stainless steel trays which are easily cleaned.

The ceilings are constructed entirely of plastic sheets above which are located the fluorescent illuminating fixtures. The advantages of the plastic ceiling are threefold; one, it contributes a minimum of contamination; two, it provides an essentially glareless and shadowless illumination; three, it necessitates a minimum of maintenance and maximum ease of cleaning. Incidentally, this illumination provides an intensity of 225 ft. candles at table height which is adequate for the finest of assembly techniques.

The "white room" also contains the storage section for incoming components, the assembly area (which includes washing stations), the inspection and functional testing area, the packaging area, and an additional area in which an operation, called tumbling, is performed on the bearings. The gage and standards room is also in the controlled area with access in and out of the main area provided by means of a smaller, auxilliary air lock.

Quality control offices are adjacent to the "white room" area and another air lock is provided for easy access for this section also. The bearing packaging operation is contained in a segregated area of the "white room" where the same provisions for cleanliness prevail.

This paper deals with the ways and means for absolute cleanliness of miniature instrument bearings, which when supporting a thrust load of 2.64 ounces can be rotated at two RPM by a turning effort of about five to six ten thousandths of an inch ounce. Considering the exacting functional requirements for these miniature instruments, it should not be difficult to appreciate that a microscopic particle of dirt in the path of the bearing balls could wreak havoc with the instrument bearing performance.

Inlet air is supplied from a separate air conditioning system which provides temperature control, humidity control, and fine filtration. The temperature is controlled at 70°±2°, while humidity is maintained between the levels of 25% to 40% relative. The latter is accomplished by subcooling the air, to lower the dew point, followed by reheating before entrance to the controlled area. When outside atmospheric conditions reduce the relative humidity to 25%, or below, additional moisture is added for the comfort of the employees.

Before entering the "white room", and after passing through standard filters, the conditioned air passes through a bank of Cambridge absolute filters. These filters are tightly sealed and filter out any particle larger in size than one millionth of an inch. After a short period of operation, the filters provide even finer filtration. The length of service of the filters is determined by the magnitude of the air pressure drop across them as shown by a sensitive differential manometer. When the pressure drop exceeds an economical amount, the filters are discarded and replaced by new filters. The conditioned air is admitted through ducts and flexible tubing and then through perforated metal openings provided between the plastic ceiling panels. The clean, dry, filtered air flows downward toward the workbenches, then across the floor to returns located at floor level in the walls. This flow pattern insures the cleanest air in the environment surrounding the assembly and related operations at bench level height. Part of the exhaust air is used as a supply for the main air compressor to insure a clean, dry supply of air to the air compressor which, with additional filtering, produces compressed air of the highest standard of cleanliness for the delicate instruments and spray guns.

Maintenance such as floor washing, waxing, and vacuum cleaning, is performed during the evening hours when no assembly or other operations are going on. A central vacuum system is located in the utility area of the main building and vacuum outlets are located in the floor which eliminates the necessity of bringing a vacuum cleaner into the room. The best of commercial cleaners discharge a considerable portion of dust and dirt back into the room through the exhaust side of the cleaner. Use of a central system avoids this hazard.

Before bearing components enter the classification and storage area of the "white room," they are batch cleaned in an ultrasonic degreaser which utilizes trichlorethylene as the cleaning solvent. The ultrasonic cleaner has three cleaning cycles. Parts to be cleaned are plunged down through a heavy vapor which is induced by holding the solvent in the cleaning vats above its vaporization temperature. After plunging through the hot vapors, the parts enter the course cleaning chamber. From the course cleaning chamber the parts come up through the vapor and are then plunged into the clean chamber which contains two barium-titanate ultrasonic transducers operating at 350 kc's. Both baths are fed by recirculated, heated solvent which is also filtered.

The vapors rising from the solvent are condensed on the chilled walls of the unit and the clean liquid solvent is allowed to drain into the clean chamber, or ultrasonic cavity. The overflow from the clean cavity flows into the course cleaning chamber. Parts thus treated are removed in a clean, dry condition and are delivered to the storage and classification room.

Next, the parts proceed to the assembly area where they are batch cleaned by a low frequency, ultrasonic cleaner which utilizes recirculated filtered solvent of the hydrocarbon type. This cleaner incorporates a magnetostrictive transducer operating at about 18 kc's.

After this operation, the components are assembled and again batch washed in the low frequency, ultrasonic cleaner followed by a hand wash and dry using spray guns and a hydrocarbon solvent. They are then stored in covered glass petri dishes.

The bearings proceed next to the inspection area, after which they are returned for an additional batch and spray wash, as described above, and are then transported to the packaging area where they are lubricated and packaged.

In all, bearings and components are washed and dried a minimum of four times before they are packaged and leave the "white room" area. In practice, due to handling or other contamination, the actual number of washes is closer to six than four. All washes are preceded by demagnetization of the bearing, or part, to insure that magnetic particles will be removed during the wash cycle.

The lubrication process occurs as the last operation performed before packaging. Lubricants, of the grease type, are chief sources of contamination at this point. In general, oils present no problem of cleanliness because they are readily passed through the finest of filters which remove all foreign particles. Maintaining the filtered condition cleanliness of the oil is easily accomplished, during dispensing, with a hypodermic syringe and needle, or by using an air-oil mist in an automatic dispensing cabinet.

Lubrication with presently available instrument bearing greases, however, is another matter. Grease is generally manufactured in large batches from materials which are not free of contaminants. The cleanest greases presently available meet Mil Spec Number

15793 which permits foreign particulate in the following quantities and sizes:

1. 10,000 per cubic centimeter of 10 microns diameter or above.
2. 2,000 per cubic centimeter of 25 microns diameter or above.
3. 100 per cubic centimeter of 50 microns diameter.
4. None over 125 microns diameter.

Even one of the smallest particles recognized by this specification (10 microns) is approximately four ten thousandths (.0004″) of an inch in size which is sufficiently large to ruin the performance of an instrument bearing. In fact, the internal looseness or radial fit up of an instrument bearing seldom exceeds a two ten thousands of an inch (.0002″) tolerance. Also, particles 125 microns in diameter, or approximately five thousandths of an inch (.005″) would prevent the bearings from turning at all, yet are permitted by the specifications and are commonly present in instrument bearing greases. Therefore, this specification is unrealistic in light of the requirements for instrument bearings today, but realistic in that is has been the best commercial manufacturers could, or would, produce.

Efforts to filter greases have been unsuccessful because of the impossibility of forcing the grease through a filter of sufficient fineness. Greases can be fused and passed through filters as liquid, but this has been unsuccessful because of the difficulty of reconstituting the grease after filtering. Additional milling (a mixing and beating process) produces greases with better texture and generally reduces the particle size of contaminates. Unfortunately the amount of improvement is debatable and in any event, even at its best is far from being enough. Efforts to induce the grease manufacturers to produce cleaner grease, in laboratory lots if necessary, were also non-productive because of the low volume requirements.

The failure to clean ready-made greases, or to interest grease manufacturers in the development of a super-clean grease, led to the conclusion that to solve the problem, it would be necessary for MPB to develop ways and means of manufacturing ultra-clean greases. In order to accomplish this, a joint program was undertaken, with the Arthur D. Little company, which has resulted in the development of a grease, compounded to meet Mil Spec Mil-G-3278 or 15793, with such a high degree of cleanliness that under the testing methods outlined in Mil Spec Number 15793, no dirt particles or contaminants of any size can be discovered. This grease, so pure that no foreign particulate can be seen at 500 power, should contribute immensely to better instrument bearing performance.

Greases prepared to date have been compounded to meet MIL-G-15793 but the process lends itself to the preparation of greases meeting any other of the military specifications. Pilot plant operations and sample runs have now been completed to the satisfaction of A. D. Little and MPB and plans are being rushed to complete a small, permanent processing plant in the present laboratory areas at MPB. When this has been done these ultra-clean greases will be made available to both manufacturers and users of instrument bearings or to anyone who may require an ultra-clean grease.

The development and availability of ultra-clean greases bridges one more gap on the path to ever higher standards of miniature instrument bearing performance. The lubricant, however, is only one link in the chain. The others, cleaning procedures and controlled environment must be of equal, or higher, standards of efficiency if the end product is to attain the exceptional performance of which it is capable and for which there is a pressing need.

Constant improvements and refinements of environmental and lubricant cleanliness, as well as of cleaning procedures, are imperative, for in spite of the intensive efforts outlined in this paper, further advances in product refinement and application will call for still more exacting and stringent standards in the near future. ■

About the Author

T. P. Barnard *is the laboratory manager in charge of product design, research and development at Miniature Precision Bearings, Inc. Barnard is a graduate of the University of Arizona with a degree in mechanical engineering. He served in the Navy during World War II in the capacity of a flight engineer and later as a plane captain.*

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Technical Committee Column

Organization of a new Technical Committee on fundamental Research is in progress with Dr. J. J. Kolfenbach of Esso Research & Engineering Company as Chairman. The objective is to facilitate discussions on a strictly scientific level of a wide variety of subjects such as the basic structure of greases. Their first meeting will be held in sufficient time so that a report of their activities will be available for presentation, along with reports of all other technical committees, at the Annual Meeting of the NLGI Technical Committee in October.

The Technical Committee on Delivery Characteristics of Grease Dispensing Equipment has a program under way involving standardization of a Newtonian test fluid versus certain greases

to guide tests conducted in accordance with the NLGI Tentative Method for Matching Lubricating Grease Flow Properties with Lubricating Grease Dispensing Pump Delivery Behavior at Low Temperatures.

Patents and Developments

Soap-Aerogel Greases

U. S. Patent 2,782,165 issued to W. H. Peterson and A. A. Bondi, assigned to Shell Developing company. Good lubricating greases are prepared in the cold by use of soap aerogels possessing the unique property of forming greases in the cold with a wide range of oil bases. A reconstituted grease is produced by washing a soap-oil gel (obtained by working into lubricating oil a fatty soap) with a liquefied normally gaseous solvent (such as butylene) to remove the oil. The butylene then is replaced with ethylene and the ethylene is removed by heating to above its critical temperature in a suitable pressure vessel. The recovered soap aerogel product (aero-soap grease) was reconstituted by addition in the the cold of mineral oil. Figure 1 shows comparable roll stabilities of the original and the reconstituted greases.

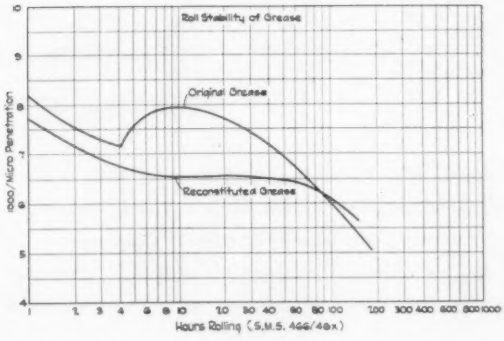
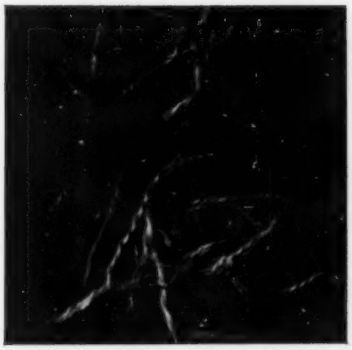


FIGURE 1

Greases Containing Adducts of Polymeric Materials

U. S. Patent 2,795,545 issued to E. W. Gluesenkamp and assigned to Monsanto Chemical company. Greases are produced by admixing lubricating liquids with a new type of adduct obtained by reacting inorganic gel-forming solids, such a clays, silica gel, alumina, etc., with polycations, i.e., high polymers (10,000-50,000 molecular weight) which undergo electrolytic dissociation to give a positively charged polymer. These become bound to the clay surface by forces much greater than those binding lower molecular weight (monomeric) basic compounds to such surfaces. The polycations are those continuous carbon chain skeleton polymers having a plurality of recurring nitrogen-containing basic groups in the molecule such that upon dissolution or suspension in water the polymer becomes a positively charged molecule or particle. Such cationic polymers include homopoly-

LITHIUM Base Grease:



Micrograph showing soap structure of lithium base lubricating grease made from 12-hydroxy stearic acid. Courtesy of Sinclair Research Laboratories, Inc.

ITS MULTI-Properties MAKE IT MULTI-Purpose

IN CHARACTERISTICS

- Non-corrosive
- Water resistant
- High heat resistance
- Rheological properties
- Eliminates abnormal wear
- Soap oxidation stability
- Cold operating properties
- Oxidation and shear stability
- Mechanically and chemically stable

IN APPLICATION

- Prepacking anti-friction bearings
- Lubrication of plain and anti-friction rotating bearings
- Lubrication of vehicle chassis points, wheel bearings, universal joints and water pump
- Lubrication of high-temperature ball bearings
- Aircraft, artillery, instrument and general ordnance maintenance

IN MARKETING

- Lower inventory
- Less dispensing equipment
- No chance for misapplication
- Reduction in lubricating time
- One grease lubricates a vehicle

IN INDUSTRY

- Ordnance
- Manufacturing
- Farm equipment
- Transportation
- Industrial maintenance

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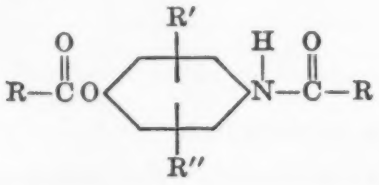
mers of vinylpyridines, e.g., 2-vinylpyridine, amino alkyl acrylates and methacrylates, N, N-dimethyl-vinylamine, quarternized polymers, such as quartenary polyvinylpyridinium halides, etc. About 2-20 weight per cent of adduct is used to form a grease gel.

Lubricating Greases Containing O,N-Diacyl-p-Aminophenols

U. S. Patent 2,795,546 issued to D. W. Young, A. J. Morway, and D. L. Cottle, assigned to Esso Research and Engineering company. Greases containing 0.1% to 2% of an O, N-diacyl-p-aminophenol as an oxidation inhibitor are claimed to have outstanding resistant properties. The inhibitor has the structure:



in which R is an alkyl group containing from 8 to 20 carbon atoms and R′ and R″ are hydrogen, i.e., in the O, N-diacyl-p-aminophenols. However, the alkylated diacyl-p-aminophenols, exemplified by the formula above, in which R′ and R″ being alkyl groups containing from 1 to 20, preferably 4 to 18 carbon atoms, are also very satisfactory as oxidation inhibitors.

Examples of suitable compounds are O, N-dilauroyl-3-pentadecyl-p-aminophenol, O, N-dilauroyl-2, 6-di-tert. butyl-p-aminophenol, O, N-distearoyl-2-isooctyl-p-aminophenol, etc.

Additional Patents

U. S. Patent 2,792,972 (Harold H. Deupree)—Cartridge grease gun assembly.

U. S. Patent 2,797,029 (Basil A. Beaver)—Grease gun.

U. S. Patent 2,797,703 (Illinois Tool Works)—Plastic Grease fitting. ■

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Color 1" Lovibond Yellow	15 max.		
Unsaponifiable	1.5% max.		
Saponification Value	198	—	203
Acid Value	197	—	202
% F.F.A. as Oleic Acid	99 min.		
Iodine Value (WIJS)	93 max.		
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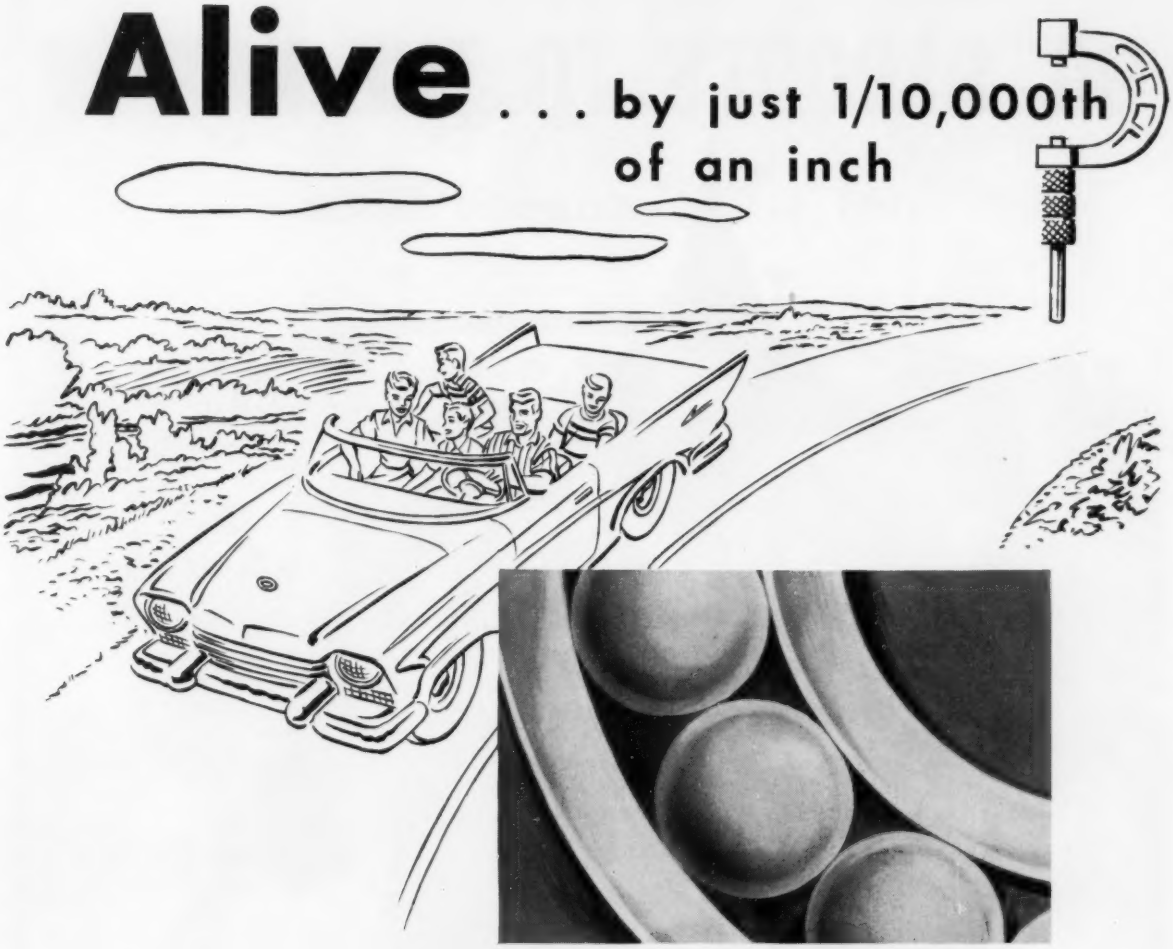

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OIL REPORTS TO THE NATION

THE petroleum industry's tenth annual Oil Progress Week will be observed October 13-19.

Climaxing a year-round public relations program, Oil Progress Week is sponsored on behalf of the industry by the Oil Information Committee of the American Petroleum Institute.

With the slogan "With Today's Gasoline, You're Driving a Bargain," the OPW celebration this year is aimed at giving the public the facts behind the quality and value of petroleum products, and a better understanding of the oil industry's contribution to the economic and social growth and development of America.

Scheduled events include speeches, civic luncheons and dinners, proclamations by governors and mayors, fairs, radio and TV programs, displays, special events, and exhibits. As in the past, all of these activities will be carried out by local oil men on a home-community basis.

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OIL PROGRESS WEEK *(continued)*

"Courtesy on the Highway" Week

Nation-Wide Charity Work

Exhibits by Radio and TV

Boy Scout Geology Project

"Lucky Folder" Prizes

Scholarship Programs

scheduled for next month are a highway courtesy campaign in New England and a charities drive in the Southeast.

In New England, oil men and women will make special efforts during the week to be good neighbors and show "courtesy on the highway" to their friends and customers. They will go out of their way to be highway "Samaritans," offering assistance to anyone in trouble. A similar courtesy campaign was conducted in Connecticut last year, and received such warm applause that it was extended throughout all of New England this year.

In the Southeast, more than 2,000 service station dealers in 15 cities will work hand in hand with local organizations to promote community charities. Recipients of these special programs will vary from Boy Scout camps and hospital funds to community chests. The drives will be sponsored by local Oil Information Committees, and will give added significance to Oil Progress Week for more than a million Southeasteners.

One of this year's new events is the industry's Boy Scout geology project. October, is Boy Scouts of America Geology Month, and the API, in cooperation with the American Geological Institute, and the American Association of Petroleum Geologists, has prepared a basic kit of materials for scout troops everywhere. The kit includes an illustrated booklet on geology, plans for making a clinometer and crystal patterns, a folder dealing with topographic maps prepared by the U. S. geological survey, and a leaflet entitled "Careers in Petroleum Geology." More than 75,000 kits have been distributed.

The program is expected to help the scouts obtain a better understanding of petroleum, geology, and of the roles that this profession and this industry play in our nation's progress. Geologists and oil men alike will give special help to this Scout program by appearing at meetings, showing motion pictures, and leading troops on field trips, where possible.

Scholarship programs, in which deserving students will be given financial aids, will be sponsored by dealers in many areas of the country. Funds are being collected on a local basis, and the scholarships will be awarded by local committees, in conjunction with educators and civic officials.

In addition, many dealers again will sponsor "Lucky Folder" programs, in which customers will be awarded a variety of prizes. Participants will receive numbered folders when they visit their local service stations, and subsequent drawings will determine the winners.

This year's motion picture, narrated by John Daly, television personality, is a series of vignettes showing oil men and oil companies at work. It will be offered to television stations during Oil Progress Week, and will be shown at schools, luncheons, and other special events.

Oil Progress Week, 1957, will highlight months of planning, preparation, and hard work on the part of more than 40,000 oil men and women on local Oil Information Committees across the nation.

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People in the Industry

Chek-Chart Elects Eldridge Executive Vice President

The appointment of Hunt Eldridge to the newly created post of executive vice president of the Chek-Chart corporation was announced by Raymond Shaw, president.

Eldridge returns to Chek-Chart after fifteen years as an executive of the Stewart-Warner corporation, Alemite division, where he was manager of oil company sales. Recently, he was sales manager of the petroleum and chemicals division of the firm.

After graduation from Yale, Eldridge joined the Chek-Chart corporation. The company was then in its second year and Eldridge served as sales manager until he accepted a position with Stewart-Warner.

Eldridge will be located in the executive offices of the company at 33 East Congress Parkway, Chicago Illinois.

Socony's Phelps Is National Oil Chairman

Thomas W. Phelps, assistant to the chairman of the board of Socony Mobil Oil Co., Inc., New York, was elected 1958 national chairman of the Oil Information Committee, public relations arm of the American Petroleum Institute, at its quarterly meeting in Colorado Springs, Colo.

Phelps succeeds M. S. Hauser, public relations director of the Ohio Oil company, Findlay, Ohio. He will assume the chairmanship at OIC's next meeting in New York, December 5-6.

Vice chairmen elected at the Colorado Springs meeting were:

R. H. Collacott, public relations director, The Standard Oil company (Ohio), Cleveland, Ohio; Russell D. Karns, assistant to the president, Pan American Petroleum corporation, Tulsa, Oklahoma; G. A. Mabry, manager of advertising and public relations, Humble Oil & Refining company, Houston, Texas, and Stewart Schackne, public relations manager, Standard Oil company (New Jersey), New York.

Donald R. Waugh of the OIC staff, New York, was elected secretary.

Huber to Gulf Public Relations Post

Appointment of W. R. Huber, director of public relations for Gulf Oil corporation, Pittsburgh, Pa., as director of the petroleum industry's Centennial celebration in 1959 was announced by Frank M. Porter, president of the American Petroleum Institute.

Huber, who has been given leave of absence by Gulf to accept this assignment, will have offices at Institute headquarters in New York City.

The Centennial, to be observed throughout 1959, commemorates the one-hundredth anniversary of the oil industry, dating from the drilling of the first commercial oil well in the United States at Titusville, Pa., in August, 1859.

"Committees representing the oil industry have been at work for more than a year developing plans for the Centennial," Porter said. "Ideas and suggestions have been reviewed by the committee on cen-

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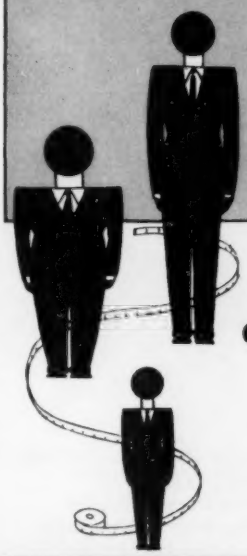

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tennial program, and by a working committee composed of oil industry public relations executives. Mr. Huber will serve as chief executive officer of the working committee in all aspects of the Centennial program.

Heyl Joins Editorial Staff of OIC

Lawrence Heyl, Jr. has joined the editorial staff of the Oil Information Committee of the American Petroleum Institute in New York, it has been announced by P. C. Humphrey, acting executive director.

Before joining API, Heyl was a member of the public relations department of the General Foods corporation, White Plains, New York, and for several years prior to that, was editor of *Texaco Topics*, the Texas company's employee magazine.

Flaschberger Promoted by Geuder, Paeschke & Frey

The promotion of Larry J. Flaschberger to the position of assistant sales manager of Geuder, Paeschke & Frey Company's steel package division has been announced by Robert C. Colyer, vice president, sales.

Mr. Flaschberger, 32, started with G. P. & F. in 1946, as a production expediter. He became a steel package salesman in 1949.

G. P. & F.'s steel package division manufacturers pails, drums, and utility cans that are used as shipping containers by the paint, petroleum and chemical industries.

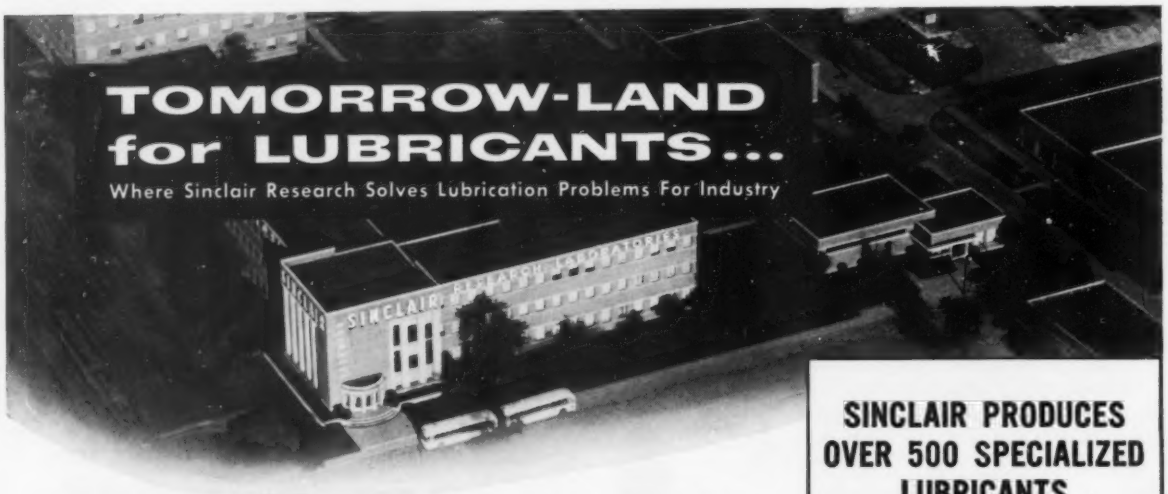
Kirk to Manage Amoco International Sales

Robert Kirk has joined Amoco Chemicals corporation in Chicago as manager for the international sales of the company's products including petroleum additives, solvents, hydrocarbon resins, plasticizers and chemical intermediates.

Kirk has more than ten years experience in export sales work including six years as manager, foreign division of Pittsburgh Coke and Chemicals company in New York and president of Pittsburgh Chemicals Mexicana S.A.

Educated in Switzerland, Kirk majored in chemical engineering at the University of Lausanne and received his baccalaureate in Lemania college at Lausanne.

Kirk is a member of the National Foreign Trade Council, the Export



Located at Harvey, Illinois, is one of the most extensive installations of its kind in the world—Sinclair Research Laboratories. These facilities are an important part of Sinclair's investment in the future. Here is where Sinclair engineers and chemists work to develop new products and improve the quality of existing ones. At these famous laboratories were developed the Sinclair lubricants now solving difficult problems in all branches of industry. If you have a special lubrication problem, write today to Sinclair Refining Company, Technical Service Division, 600 Fifth Avenue, New York 20, N. Y.

SINCLAIR PRODUCES OVER 500 SPECIALIZED LUBRICANTS for

TURBINES
DIESEL ENGINES
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and many other applications

SINCLAIR REFINING COMPANY

Managers club of New York and the American Institute of Chemical Engineers.

Subsidiary of Standard (Indiana)

Amoco Chemicals corporation was organized as a subsidiary of the Standard Oil company (Indiana) in January, 1957. The company combines the manufacturing, research, development and sales operations of Indoil Chemical company, Hidalgo Chemical company and Pan American Chemicals corporation.

Company offices are located at 910 South Michigan Avenue, Chicago 80, Illinois. Manufacturing facilities include plants at Texas City and Brownsville, Texas. A plant is under construction at Seymour, Indiana; and another at Joliet, Illinois has been announced. The company has technical service laboratories at 3201 South Michigan Avenue, Chicago, Illinois.

Company officers are Jay H. Forrester, president; John J. O'Connell, marketing vice president, Dr. John W. Bertetti, manufacturing vice president; Russell L. Brown, secretary; Thomas W. Hughes, financial officer; and James R. Jones, comptroller. Forrester, O'Connell, Bertetti and Hughes are also directors of the company. Other directors are G. A. Harrington, general manager of development; R. L. Hockley, consultant and Larry L. Smith, manager of the company's Brownsville plant.

Products of Amoco Chemicals corporation include: Indonex and Panaflex plasticizers, Indopol polybutenes, Amoco octyl and decyl alcohols, 10° xylene, nitration grade toluene and lubricating oil additives, Panapol hydrocarbon polymers and polymer solutions, Panasol solvents and Panarez hydrocarbon resins.

Great Northern Oil Announces Controller

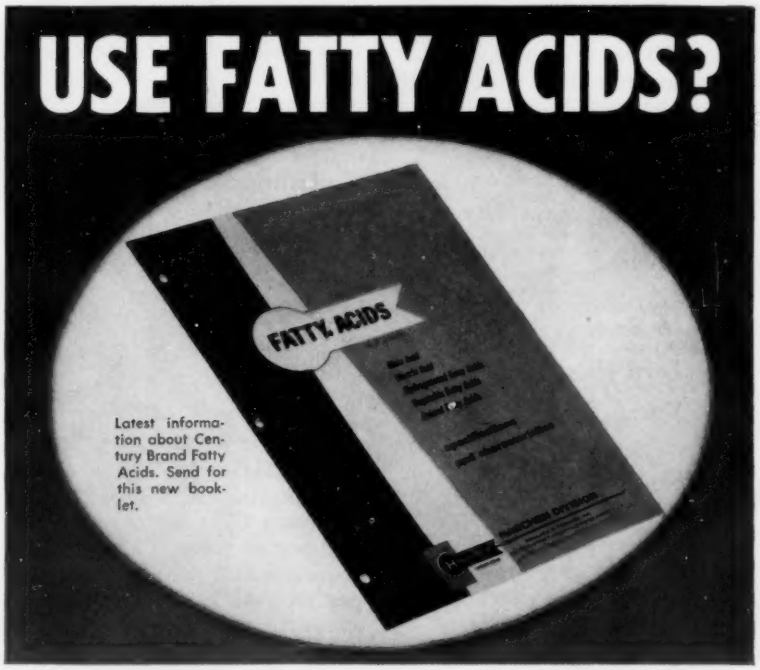
Arthur W. Winter, Tucson, Arizona, has been elected controller of Great Northern Oil company, it was announced by W. J. Carthaus, president.

A native Minnesotan and a graduate of Carleton college, Winter headed his own firm, Winter Distributing company, Tucson, Arizona, from 1950 to 1957. Previously he was president of Roosevelt Oil and Refining company, Mt. Pleasant, Michigan, where he had risen from assistant chemist upon graduation from Carleton in 1937, to the top executive post in 1950.

Swift Co. Announces Technical Representative

Vincent E. Palomba has been appointed a sales representative for the technical products department

Continued on page 48



HARCHEM INVITES YOU TO COMPARE

If you use Fatty Acids you will want Harchem's new publication of specifications and characteristics for their Century Brand Fatty Acids. Harchem gives you the latest data about all grades in their complete line of uniform quality fatty acids. You are the best judge of the type and grade you need. By using this information as a basis for comparison, you can select the fatty acid best suited for your specific use.

Harchem offers you a free type sample of the kind and grade Century Brand Fatty Acid you specify. We invite you to make comparisons with any competitive product of like grade.

Write us on your letterhead for a copy of our new publication. Ask for Bulletin H-29.

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Provide greases, gear lubes, stamping lubes, drawing lubes, and cutting oils with extreme pressure properties at minimum treatment cost from Carlisle's complete E. P. line. Choose the best additive or combination of additives from this wide selection, which includes:

Lead
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Lard Oils
Mineral Oils
Sperm Oils
Hydrocarbons

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Alpha-Chlor 33
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For full information on any of the above E.P. additive groups, write . . .

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CHEMICAL WORKS, INC.
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manufacturers of
fine industrial chemicals

of Swift & company, Hammond, Ind.

Palomba's responsibilities will include the sale of Swift's complete line of fatty acid and industrial oils throughout Wisconsin, Minnesota, Iowa, and Northern Illinois, Fred Beneker, general sales manager, announced.

Palomba is a graduate of the University of Delaware and he served in Swift's research laboratories before joining the sales department. He will make his home in Milwaukee.

Lithium Corp. Appoints Vice President

Lithium Corporation of America, Inc., announces the appointment of Harry D. Feltenstein, Jr., of Kansas City, to the newly created post of financial vice president and chief financial officer. For the past six years, Mr. Feltenstein was associated with the brokerage and investment banking firm of Merrill Lynch, Pierce, Fenner & Beane, and during this period he acted as Lithium Corporation's principal outside financial consultant.

Mr. Feltenstein graduated from Harvard College in 1942. During World War II, he served aboard a destroyer in the Pacific. Following the war, he was engaged in editorial work in New York until he entered the brokerage field in 1950.

Jackson Chairmans Socony Coordinating Group

R. Rea Jackson, general manager of the manufacturing department and chairman of the manufacturing committee of the Socony Mobil Oil Company, Inc., has been appointed chairman of the company's coordination committee. He succeeds Frederic R. Pratt, who joined the company 26 years ago and assumed the post of chairman of the coorination committee in 1953. Mr. Pratt is retiring to devote his time to personal interests.

Succeeding Mr. Jackson is Thomas P. Simpson, who had been vice president and director of manufacturing of General Petroleum corporation, West Coast affiliate of Socony Mobil.

Mr. Jackson began his career in the oil business in 1923 as a chemist in the Beaumont, Texas, refinery of Magnolia Petroleum company, Socony Mobil's southwest affiliate. He was named manager of Socony Mobil's Paulsboro, New Jersey, refinery in 1947 and three years later he came to New York as a member of the manufacturing committee. After a period of government service, Mr. Jackson returned to Socony Mobil, becoming manager of the company's foreign refining operations. In 1956, he was appointed general manager of the manufacturing department. Mr. Jackson, a native of Fort Worth, Texas, graduated from the University of Texas as a chemical engineer in 1923.

Mr. Simpson, who joined General Petroleum corporation in 1924 as a chemical engineer, was transferred to Socony Mobil in the mid-thirties. He became director of the research and development department of the company's laboratories before returning to the West Coast affiliate as vice president in 1953.

Gulf's Clark Addresses Oil Jobbers

The September 18 issue of the *Gasoline Retailer* gave in part an address by D. P. Clark of Gulf Oil corporation and a member of the Board of Directors of NLGI, at the Oil Jobbers Management Institute, University of Mississippi in Oxford. His discussion covered the broad general principles involved in locating a station and some of the specific factors to be considered. Clark appeared during the week of September 9.

"J&L phosphatizes ***in-the-round?***
. . . you mean after the shell
is formed and welded?"

"Sure, how else can you properly
phosphatize the ***seam?***
J&L gives us a 100% job!"

- J&L specialists, backed up by modern research, are ready to consult on your toughest packaging problems.
- J&L, an integrated steel producer, controls container quality from start to finish.
- J&L steel containers provide engineered packaging for dependable transportation and safe storage.
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- Prompt dependable delivery from nine plants.

Call your nearest J&L Container Division office for recommendations on your packaging problems. Or write direct to the Container Division, 405 Lexington Avenue, New York 17, N. Y.

STEEL

Jones & Laughlin

...a great name in steel

Industry News

Lincoln Marketing New Lube Reel Equipment

Lincoln Engineering company, Saint Louis, has announced the manufacture and distribution of a new line of the company's lubricating equipment, under the trade name, "Golden Standard Lubreels." Designed to transform the dealer's lubritorium into a sparkling "showcase for sales," the new lubreels are available in a complete line for all standard services, to fit any size operation.

The Golden Standard lubreels feature Lincoln's vertical-flo styling, and are richly trimmed in gold tone and heavy chrome. They can be installed on ceiling or wall. Reels are automatic retracting; air or spring powered. They have adjustable retraction speed, with equalized pressure control to permit adjustment of tension to the operator's own preference. Other features include smooth, easy operation, positive locking action, and an automatic safety latch to prevent accidents from hose unreeling on the floor.

Ease of Installment Is Big Feature

The new lubreels are quickly installed by simply bolting the mounting rails to ceiling or wall. Lubreels for each service are then attached to the rails with two bolts. No sub-base is required.

For complete details address Lincoln Engineering Company, 5702-30 Natural Bridge Avenue, St. Louis 20, Mo.

Werner Smith Produces New Alcohol Ester

Werner G. Smith, Inc., announces a new wax known as Hywax 135. The new fatty alcohol ester is water white and extremely heat stable and changes color very little when heater to 290° C. (554° F) and will stand prolonged heating at fairly high temperatures. The stability is partly due to its low iodine number 1.0 maximum and the high purity. A new method of refining and purification makes possible this new development.

The product is said to have little odor, is non-volatile and doesn't oxidize or change when exposed to heat, light and air.

Suggested uses include lubricant for plastics, textile finishes and processing aids, superfatting agent, lubricants, rust inhibitors, wire drawing compounds, fatty alcohol manufacture, lacquers, and lubricating greases.

The company is located at 1730 Train Avenue, Cleveland 13, Ohio.

Sonneborn Formulates Petronate Product

A new formulation of Petronate, a product of L. Sonneborn Sons, Inc., has been utilized in drilling mud to help drill oil wells in Venezuela faster and give costly drill bits a longer working life.

The mud was developed by Mene Grande Oil company, of Venezuela, and has resulted in average savings in drilling time of about 25%, with approximately 20% fewer drill bits required.

Both the new oil emulsion drilling mud and the process of using it, are covered by a Gulf Oil corporation patent. Non-exclusive licenses are available from Gulf Oil

Continued on page 52

almost
Everything that moves
DEPENDS ON GREASE!

Almost everything that moves either in actual operation or in the process of its making . . . from gate hinges to tractor wheels . . . depends upon grease. That is why lubricants should be bought with care. You can always depend upon Deep Rock highest quality greases and lubricants. They are manufactured to give top lubrication to all moving parts.

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Manufacturers of
LUBRICATING
GREASES

- *New designation approved* by American Petroleum Institute classifies and defines the new, higher-performance multipurpose lubricants from all other oils.
- *New A.P.I. definition* describes gear oil having very high load-carrying capacity, plus other necessary characteristics, needed for the most stringent conditions of speed and torque.
- *New market opportunities* for gear lube manufacturers are here today in service station sales of multipurpose oils meeting *A.P.I. Service GL4.*
- *New multipurpose oil,* under study for inclusion in vehicle instruction manuals, can be accurately identified and furnished to protect hypoid gears in cars and trucks, spiral bevel gears, many transmissions and worm gears.

MAKE TRUE MULTIPURPOSE GEAR OIL

WITH SANTOPOID 22RI

You can be among the first to market a true multipurpose gear lubricant meeting A.P.I. Service GL4. Let Monsanto's 3 years' experience with formulation and service-checking guide you in formulating Santopoid® 22RI to make *one* lubricant for *all* purposes—at the performance level you specify. For more information and samples of Santopoid 22RI, write today to:

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MONSANTO CHEMICAL COMPANY
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corporation and L. Sonneborn Sons, Inc.

Petronate is a Sonneborn trade name for a family of products which derive from the sulfonate group. It is a product of the sulfonate division of L. Sonneborn Sons, Inc.

NLGI President Lane Sends Special Letter to Kyodo Grease Times

The July issue of the *Kyodo Grease Times* carried a congratulatory letter from J. W. Lane, NLGI president. Lane sent warm greetings on behalf of the National Lubricating Grease Institute in observance of the tenth anniversary of the rebuilding of the Tsujido factory of Kyodo Yushi company. Addressing Mr. S. Kofune, president of the Japanese active member firm, Lane stated "Certainly, on the eve of our own NLGI 25th anniversary, we of the Institute in the United States count the active participation of Kyodo Yushi as a significant achievement and one attesting to the world-wide character of the Institute."

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CORRECT LUBRICATION

Mobil

Makers and Marketers of

Mobil Automotive Products

Mobil Industrial Oils and Greases

Socony Mobil Oil Co., Inc.

and Affiliates: MAGNOLIA PETROLEUM CO. GENERAL PETROLEUM CORP.

MGM Produces Oil Progress Film Series

Metro-Goldwyn-Mayer studios in Culver City, Calif., has been selected to produce the first of a proposed series of one-hour color films for television as a part of the oil industry's centenial celebration in 1959, it has been announced by Frank M. Porter, president of the American Petroleum Institute, and Joseph Vogel, president of Loew's, Inc.

The title of the series will be "Centennial." With top Hollywood stars and outstanding directors and writers, MGM's forthcoming television production promises to be one of the entertainment highlights of the 1959 network season.

Agency for the American Petroleum Institute's planned TV series is Batten, Barton, Durstine & Osborn, Inc., which has an outstanding record of experience overseeing both live and film television programs of many leading American industries including Du Pont's "Show of the Month" series, the Armstrong Cork Company's "Circle Theater," U. S. Steel's "United States Steel Hour" and General Electric's "GE Theater."

Vulcan Produces 55-Gallon Drums to Meet Rising Demands

In a move to meet the rising demands of key U. S. industries to have one supplier for the popular capacities of steel shipping containers, Vulcan Containers Inc., pioneer metal container manufacturer, has expanded its production to include mass production of 55-gallon drums.

George E. McMahon, executive vice president, announced that the 41 year old Bellwood, Ill., firm was extending its output of steel

H. B. Scharbach, left, vice president of sales and NLGI company representative, and G. E. McMahon, executive vice president examine first drum off Vulcan's assembly line.

containers to produce 55-gallon drums because of the heightened need for greater steel packaging particularly in the chemical, paint, food, and petroleum products industries.

"Increasing use of steel drums

HARSHAW LEAD BASE

Harshaw Lead Base, as an additive to petroleum lubricants, improves extreme pressure characteristics and imparts the following desirable properties:

- Increased film strength
- Increased lubricity
- Improved wetting of metal surfaces
- A strong bond between lubricant and metal surfaces
- Resistance to welding of metals at high temperatures
- Moisture resistance and inhibits corrosion

Harshaw Lead Bases are offered in three concentrations to suit your particular needs:

Liquid	Liquid	Solid
30% Pb	33% Pb	36% Pb

Other metallic soaps made to your specifications. Our Technical Staffs are available to help you adapt these products to your specific needs.

THE HARSHAW CHEMICAL CO.

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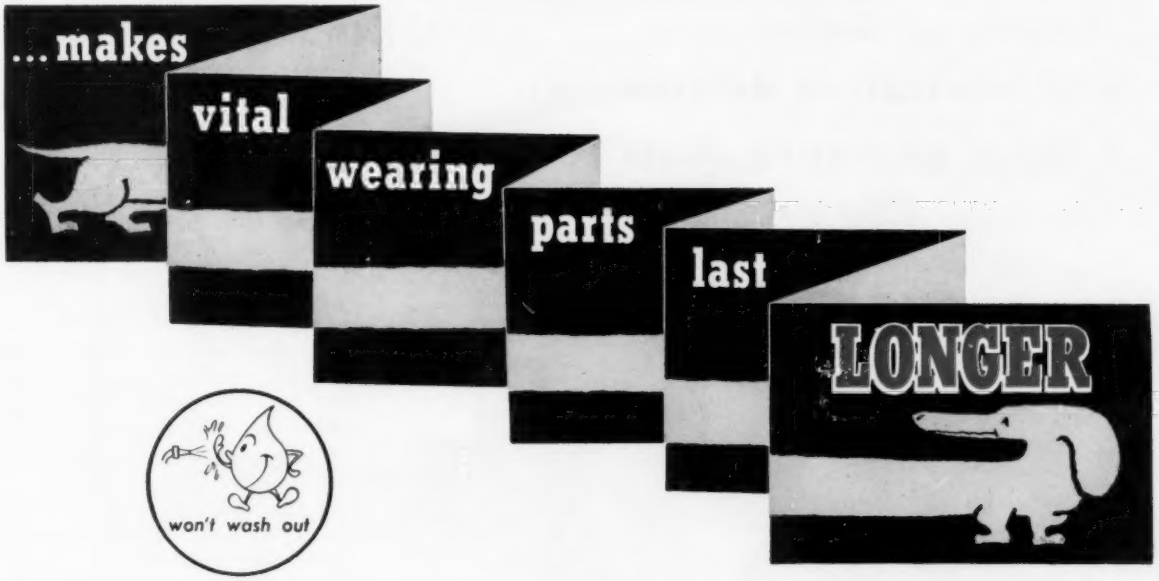
Lithium-Base Multi-Purpose

INLUCITE 21...



Because INLUCITE 21 *stays put* in the presence of water . . . because it won't squeeze out or melt out under the most severe conditions of temperature and load, INLUCITE 21 outlasts every specialized grease it replaces in wheel bearings, water pumps, universal joints, springs, shackles, and other grease-lubricated bearings. A trial will convince you. Write for full details.

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NEW ORLEANS, LOUISIANA
Manufacturers of Quality Lubricants • AVIATION • INDUSTRIAL • AUTOMOTIVE • MARINE
With Research Comes Quality, With Quality Comes Leadership

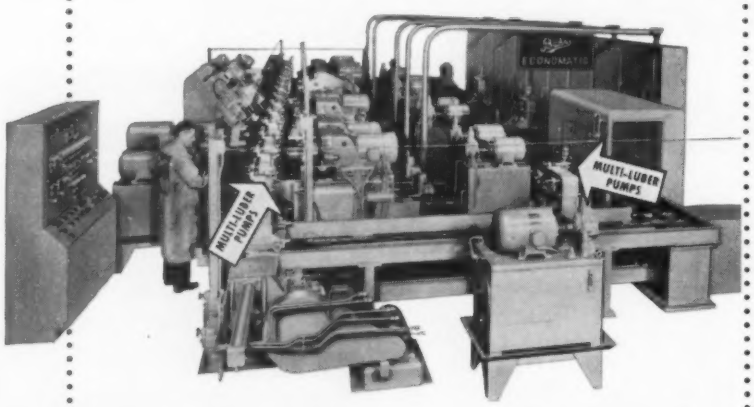
Lincoln *Multi-Luber**

POWER LUBRICATION SYSTEMS

for automated machine groups and components

End lubrication down-time...

Reduce operating costs



55 DIFFERENT OPERATIONS EVERY 22 SECONDS...
and not one second of down-time for lubrication

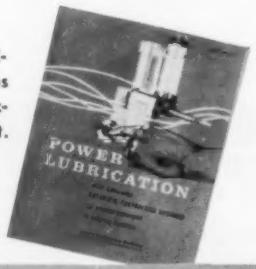
All moving parts on this automated Buhr Economatic, including fixtures, are automatically lubricated at predetermined intervals by a Lincoln Multi-Luber Centralized Power Lubrication System. Costly down-time for lubrication is eliminated, along with excessive bearing wear and breakdowns due to inadequate lubrication.

Engineered for Positive, Reliable Lubrication

Lincoln Multi-Luber Systems are especially designed and engineered to keep pace with high rates of production, to save valuable man-hours, and eliminate needless repairs. A premeasured film of refinery pure lubricant is automatically applied to bearings at predetermined, self-controlled time intervals. On existing facilities and new equipment, these Systems provide a tested, low-cost method that improves production efficiency, lengthens service-life, and reduces operating costs.

Send for new free catalog

Full information and specifications on Lincoln Multi-Luber Automatic Power Drive Lubrication Systems for automated lines... machine tools... production equipment... materials handling equipment. Write today for Catalog No. 811.



Lincoln *Trade Name Registered

LINCOLN ENGINEERING COMPANY
Division of The McNeil Machine & Engineering Co.

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is one means employed by firms in these industries of stepping up their shipping and packaging operations to keep pace with rising production, boosted by automation and other technical developments," McMahon explained.

Effective in October, Vulcan is offering a full line of open heads and closed heads, 55-gallon steel drums, manufactured to comply with Universal Standard dimensions, to meet I.C.C. and Uniform Freight Classification specifications.

A variety of types and sizes of openings, fittings, and plugs will be available for the different style drums. The open head style will be furnished with the lever or bolt locking covers. In addition to standard colors and for product and company identification, the drums can be decorated, striped, or painted any solid color.

Vulcan will continue to produce a wide variety of smaller steel shipping pails, ranging in size from one to fifteen gallons. Its highly flexible production operation and unique ready-for-shipment inventory of more than 100,000 pails—a varitable department store of steel shipping containers—enables Vulcan to meet special requirements and production emergencies of its customers.

U. S. Steel Seamless Cylinders Effected

The era of nuclear power plants, guided missiles, atomic energy and expanding industrial facilities has brought about the need for high quality seamless steel cylinders used as containers to hold gases and chemicals under pressures up to 10,000 pounds per square inch.

U.S. Steel's National Tube Division's Christy Park works in McKeesport, Pa., is busy these days turning out a wide variety of these cylinders to meet these new requirements.

A few years ago wall thickness of ½ inch capable of withstanding 2,200 pounds of pressure per square inch was considered adequate for the storage of the few gases then on the market. Today, however,

FOR THE MANUFACTURE OF GREASES THAT DELIVER

Top Performance...

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GULF QUALITY STOCK OILS

GULF

A COMPLETE line of stock oils, quickly available to you through strategically located warehouses, terminal facilities, and refineries in 31 states from Maine to New Mexico. Also quality petrolatums.

GULF OIL CORPORATION
2927 GULF BUILDING
PITTSBURGH 30, PA.

chemists are busy developing new gases and finding new uses for the commonly known ones which must be stored in cylinders at pressures from 500 pounds per square inch to 10,000 pounds per square inch with wall thicknesses up to 3 inches.

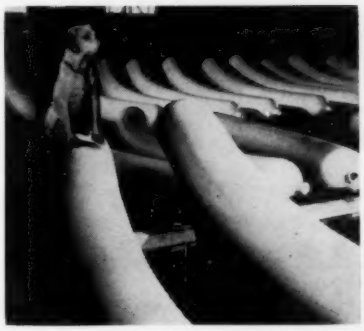
This requires heavy wall cylinders of high alloy steels which have been developed to do this job. Also cylinders for the chemical industry have been developed of high quality stainless steels to combat the corrosive quality of these much needed chemicals.

U. S. STEEL'S Christy Park Works is visited by company secretary who finds striking resemblance between the new seamless steel cylinders and hot dog she is about to devour.

The manufacture of cylinders is not a new product for the Christy Park plant as cylinders have been produced there for over 40 years. They vary in size from 3 feet in length to 80 feet and can be produced as large as 30 inches in diameter.

The cylinders are produced from white hot billets which are pierced into a hollow forging under great pressure to form the rough cylinders or from plates which are cupped and drawn. They are then further drawn into desired sizes, and machined to meet customers requirements. The ends of the cylinders are hot formed either by spinning, swaging or forging.

Interior cleanliness is most important and other critical requirements include the type of steel used, application of normalizing or special heat treating and hydrostatic testing of the finished cylinder. Cylinders must not only meet customer and Defense Department specifications but the rigid specifications set forth by the I.C.C. and A.S.M.E.



Dog surveys cylinders which have thicknesses up to three inches to contain pressures as high as 10,000 pounds per square inch. The length varies between three and eighty feet.

National Tube in recent years

has made cylinders for the government's guided missile program. Here, cylinders are used to hold hydrogen, helium and nitrogen under extremely high pressures to back up the propellant for the missile. Cylinders are made for the oil refining industry where hydrogen is used to make the new high octane gasoline for today's cars.

The use of hydraulics to operate heavy machinery in the country's mills and factories has placed an increasing demand on the cylinder producers. Cylinders must be made to accelerate machinery at pressures of 2,500 pounds per square inch and over. Examples of this use are the cylinders which operate giant extrusion presses turning out airplane parts.

Welding in industry with helium and argon gases has become more and more prominent in recent years resulting in an increasing demand for high pressure containers to handle these gases. In many cases these vessels must be made to stand the rigid tests for use of both stationary storage and the transporting of the gases over public roads and railways.

National Tube is ready to meet the challenge of today's cylinder requirements and has been recognized the world over for its quality products.

Hooker, Foote Jointly Explore High Energy Fuel Venture

Hooker Electrochemical company, Niagara Falls, N. Y. and Foote Mineral company, Philadelphia jointly announced that they are together exploring possibilities for the development, production and sale of components of high energy fuels. Currently, their interests are confined to lithium perchlorate and ammonium perchlorate, materials which act as oxidizers in fuels for rockets and missiles, but studies may be extended to other high energy fuel components later. The joint announcement is made by R. Lindley Murray and Gordon H. Chambers, board chairmen of Hooker and Foote.

The two companies each have skills, knowledge and basic raw material positions in this highly specialized field which complement each other and the logical combination of assets should provide the greatest mutual benefit in the successful development of high energy fuel components to Hooker, Foote and the consuming industries.

Hooker last year acquired Oldbury Electro-Chemical company, believed to be the world's largest manufacturer of chlorates which include sodium perchlorate, potassium perchlorate, sodium chlorate, potassium chlorate and perchloric acid. Thus Hooker has basic chlorate-perchlorate production facilities and technology.

Foote, understood to be the world's largest producer of lithium metal and its salts, has a basic position in owning extensive lithium ore

It's Jayhawk Mills for Higher Quality Products

☆ Compact
☆ Dependable
☆ Guaranteed

Built into this modern Jayhawk Mill are the features you have always wanted: **STRENGTH** to withstand severe service, **POWER** to handle any material, and **SIMPLICITY** so that any operator can handle it.

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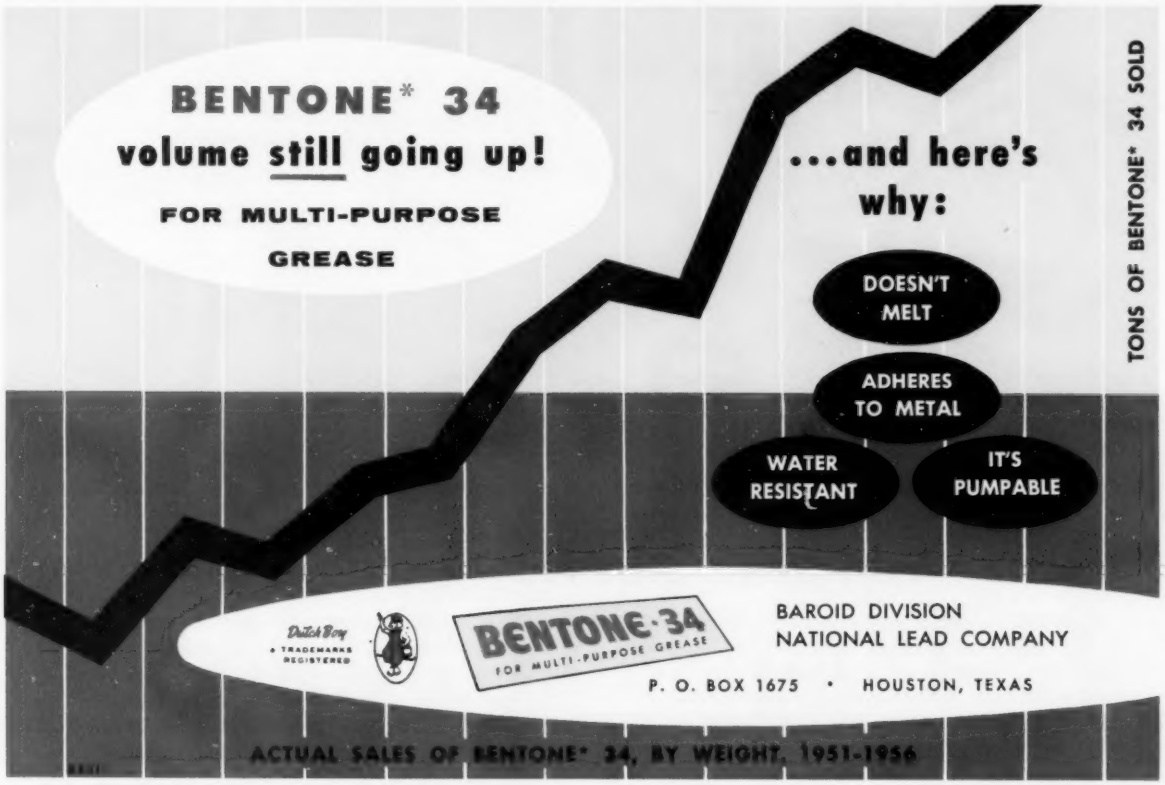
Write or Phone

Jayhawk Manufacturing Co., Inc.
120 North Adams Hutchinson, Kansas



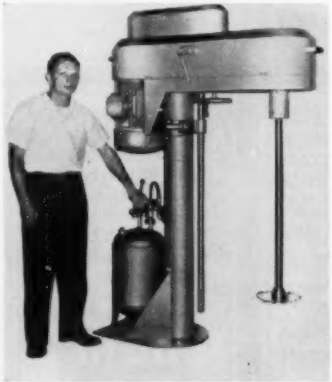
deposits as well as lithium salt and metal production facilities. Foote has research background and pilot plant production experience with lithium perchlorate and ammonium perchlorate.

Cowles Increases Mixer Power With Two New Production Dissolvers

Two new large size production dissolvers with increased mixing power and flexibility have been introduced by Cowles Dissolver company, Cayuga, New York.

A new large capacity mixer, model 510VHV is designed to bring variable speed to big batch mixing. It enables operation at optimum speeds from 900 to 1200 rpm to handle a wide variety of mixing and dispersion problems. Unit is powered by a 7½ or 10 H.P. motor, and has a hydraulic lift for 42" maximum rise. Bridge may be swung in 180° arc.

Largest-capacity lift-type yet developed is the new model 720VH. While maintaining a small working area, this model makes possible the application of 20 to 40 H.P. 1800 rpm motors for handling big volume and high viscosity batches. By means of sheaves, speed ranges of the impeller-shaft are 900 to 1500 rpm. Net weight of the entire unit is only 2000 lbs., a decrease of over 37% from former units of comparable capacity. Hydraulic lift allows 48" maximum rise. Bridge swings in 150° arc.



NEW model 510 VHV provides variable speeds for large batches of grease.

Full information is available from Morehouse-Cowles, Inc., 1150 San Fernando Road, Los Angeles 65, Calif.

News continued on page 58

LET US MODERNIZE
YOUR PLANT

C. W. NOFSINGER CO.

Petroleum and
Chemical Engineers

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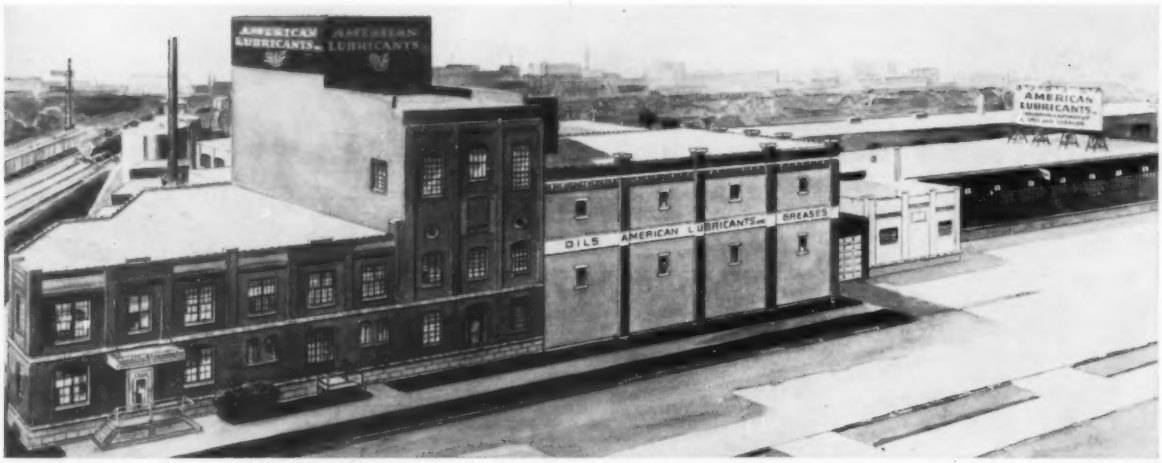
KANSAS CITY 6, MO.

"In Engineering it's the People that count"



THE American Lubricants plant in Buffalo as it is today with modern materials handling equipment and new docks.

American Lubricants Expands Niagara Frontier Plant

A three year expansion program costing over $320,000 in a continuing development plan, was concluded August 1 at the American Lubricants plant in Buffalo, New York with the opening of new shipping and storage facilities. These are located in recently acquired buildings adjoining the main factory.

Additional floor space of 25,000 square feet was obtained with the purchase of buildings west of the main plant and executive offices at 1575 Clinton street. This new area is for storage of containers and preparation of products for shipping. Eight truck docks, a covered railroad siding and conveyor systems for unloading empty containers and moving them through the production lines and to the shipping department are provided in this new area.

Helmut R. Katzmann, president, reported; "Higher sales volume during the past few years has necessitated increased product output and considerable planning went into the purchase of new equipment for these new buildings to achieve continuity of flow from raw materials to finished products. New manufacturing methods call for higher processing temperatures, larger pressure cookers, more receivers and greater capacity colloid mills. Our plant is now operating on shorter cycles with more frequent and regular scheduling of kettle operations. New and larger blending tanks, increased storage facilities and the most modern conveying and handling equipment which we added to our facilities have greatly increased our output."

Melville Ehrlich, vice president and research director said, "It is very rewarding to see careful

SWIFT'S INDUSTRIAL OILS INVITE COMPARISON

Write for a trial order of any of these Swift quality products . . . a trial in your own shop will convince you of their stability and dependability in helping to produce lighter and more uniform lubricants.

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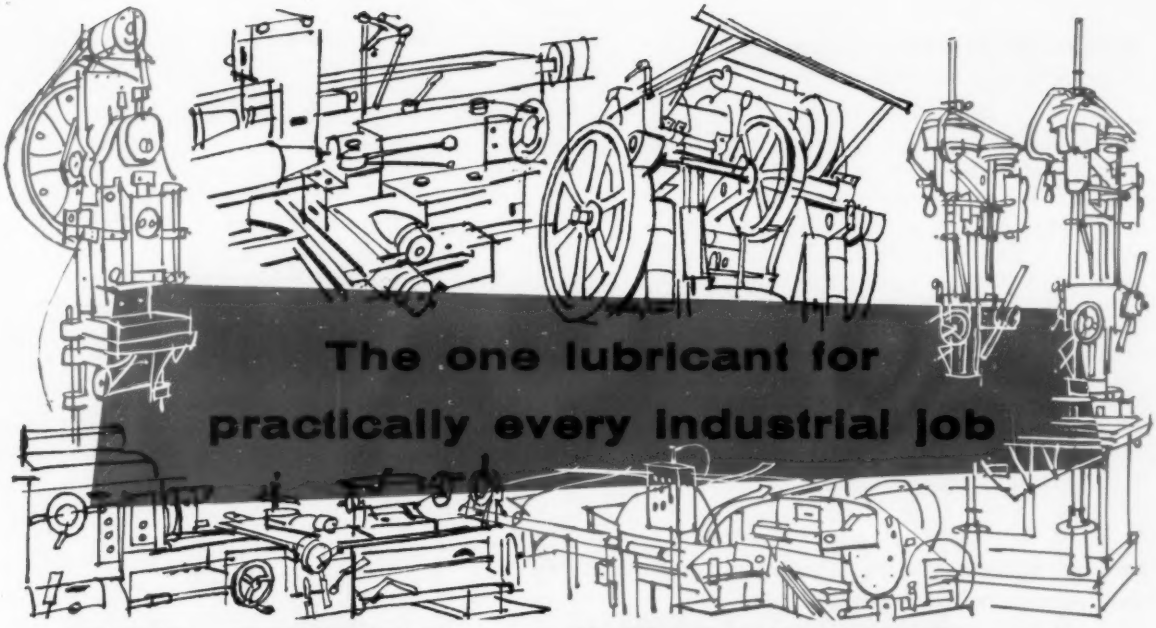
RED OILS • STEARIC ACIDS • LARD OILS • SPERM OILS • TALLOWS • HYDROGENATED CASTOR OILS, GLYCERIDES, & FATTY ACIDS • METHYL #12-HYDROXYSTEARATE • #12-HYDROXYSTEARIC ACID • VEGETABLE FATTY ACIDS • TALLOW FATTY ACIDS • ACIDLESS TALLOWS

Swift

To Serve Your Industry Better

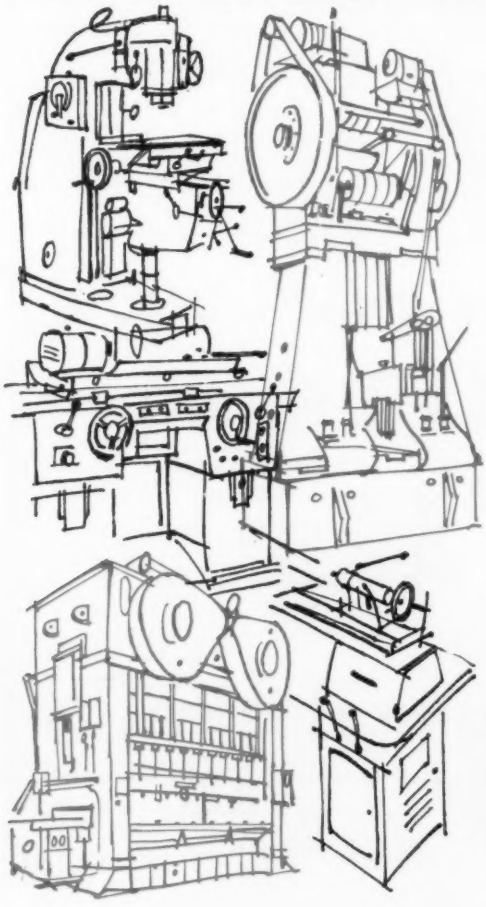
PHOTOGRAPH of the plant in 1936.

Continued on page 60



ATLANTIC LUBRICANT 54

Performs on all types of grease-lubricated machinery • Cuts cost • Reduces lubricating errors



Atlantic Lubricant 54—an outstanding multi-purpose lubricant —assures:

- **Wider application**—almost universal application to grease-lubricated equipment in plants of all sizes
- **Excellent performance** at very high to extremely low operating temperatures
- **Reduced losses** from lubricating error
- **Lower costs** of warehousing and handling
- **Outstanding rust protection** for all ferrous surfaces
- **Unusual stability** against oxidation and softening—even under very rugged conditions
- **Easy, positive identification**—thanks to Atlantic Lubricant 54's distinctive purple color

Available from conveniently located warehouses. Call any of the Atlantic offices listed below.

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260 So. Broad St.

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Chamber of Commerce Building

PROVIDENCE, R.I.
430 Hospital Trust Building

SYRACUSE, N.Y.
Salina and Genesee Streets

READING, PA.
First and Penn Avenues

CHARLOTTE, N.C.
1112 South Boulevard

In South America
Atlantic Refining Company of Brazil, Rio de Janeiro

American Lubricants Expands Niagara Frontier Plant

Continued from page 58

plans materializing with good results. It spells satisfaction for us and, more important, improved products for our customers."

The history of American Lubricants parallels business development on the Niagara frontier. Founded as the Glido Oil Company, Inc. in 1922, the name changed three years later to its present form. The founder and first president of the company, Paul E. Fitzpatrick, has been prominent in business development of Buffalo and active in Democratic politics. He was New York State Democratic party chairman from 1942 to 1952. He is presently chairman of the board of directors of the Corporation and has just been named to the board of trustees of Cornell university. Mr. Fitzpatrick graduated from the civil engineering college of Cornell.

American Lubricants has pioneered in the development and refinements of many lubricants. At present more than 300 active formulae are in production. Included are specialties for the automotive, mining, machine tool and highway machinery fields.

Mr. Katzmann feels that the New York state thruways and the St. Lawrence seaway will be contributing factors to the industrial and commercial growth of Buffalo and will mean increased volume in their field in the near future. Outlines are now being made for additional development in American Lubricant's continuing plan of preparation for the needs of industry in the future.

Monthly Newsletter on Lithium Now Available From American Lithium Institute

In a move designed to meet the growing demand for information on lithium and its compounds, the American Lithium Institute has commenced publication of a monthly newsletter—"What's New With Lithium."

The newsletter will be mailed to management, technical and production people in a wide number of industries where lithium has found application or might conceivably be applied in the future. It will include a review of new developments in the field of lithium as well as a summary of current articles appearing in trade and business publications.

Lightest of the metals, lithium can be used to form many compounds, each of which has advantages in particular end uses. Among the numerous applications for lithium and its compounds today are lubricating greases, ceramics, welding and brazing, air conditioning, storage batteries, metal refining, catalysis and electrochemistry. It also shows strong promise for use in the fields of nuclear energy, pharamceuticals, alloys, and propellents.

Individuals wishing to be placed on the mailing list to receive "What's New With Lithium" each month should write to: American Lithium Institute, 32 Nassau Street, Box 594, Princeton, New Jersey.

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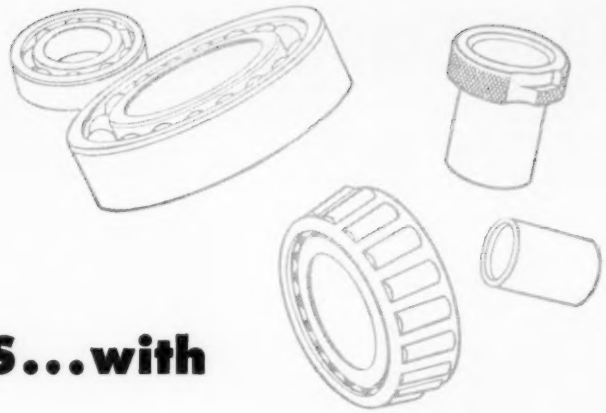
"Never Underestimate the Importance of Lubrication"

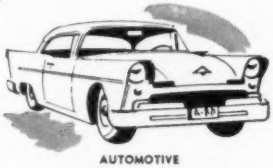
Make more versatile LITHIUM LUBRICANTS...with



Hydrofol 200

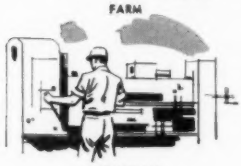
FATTY ACIDS OR GLYCERIDES

(Hydrogenated Castor Oil Products)



AUTOMOTIVE

FARM



INDUSTRIAL

Lithium base soap gels made from either Hydrofol Acids 200 or Glycerides 200 provide outstanding lubricant performance at extreme temperature ranges. They inhibit graining and produce lubricants with a fine, hard texture and a high dropping point. Their characteristics make fine greases even finer. They add outstanding water, temperature and shear resistance to the grease.

For more complete information on use of Hydrofol Acids 200 and Glycerides 200 in your grease formulations, write on your letterhead or telephone your ADM Representative.

SPECIFICATIONS

	HYDROFOL FATTY ACIDS 200 (12-Hydroxystearic)	HYDROFOL GLYCERIDES 200 (Hydrogenated Castor Oil)
Melting Point °C		86-88
Titer °C	70-74	70-74
Acid Number	172-182	4 Maximum
Iodine Value	4 Maximum	3 Maximum
Saponification Value	182-187	177-181
Acetyl Value	133 Minimum	138 Minimum
Hydroxyl Value	147 Minimum	155 Minimum

Hydrofol PRODUCTS

Hydrogenated and Distilled Fatty Acids and Stearic Acid ... Hydrogenated Vegetable, Fish, Sperm Oil and Tallow ... Hydrogenated Castor Oil ... Stearyl, Cetyl, Oleyl Alcohol ... Sperm Oils and Spermaceti ... Behenic Acid ... Erucic Acid ... Hydroxystearic Acid ... Olefins ... Hydrocarbons.

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Let Continental's Perma-Lined containers work for your hard-to-hold products. Call soon.

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Perfected by Continental's Research and Development Center in Chicago —and backed by our vast experience in all types of metal packaging—Perma-Linings are available to fit almost every chemical, paint and petroleum product. Moreover, we are prepared to develop new Perma-Linings for your special use.

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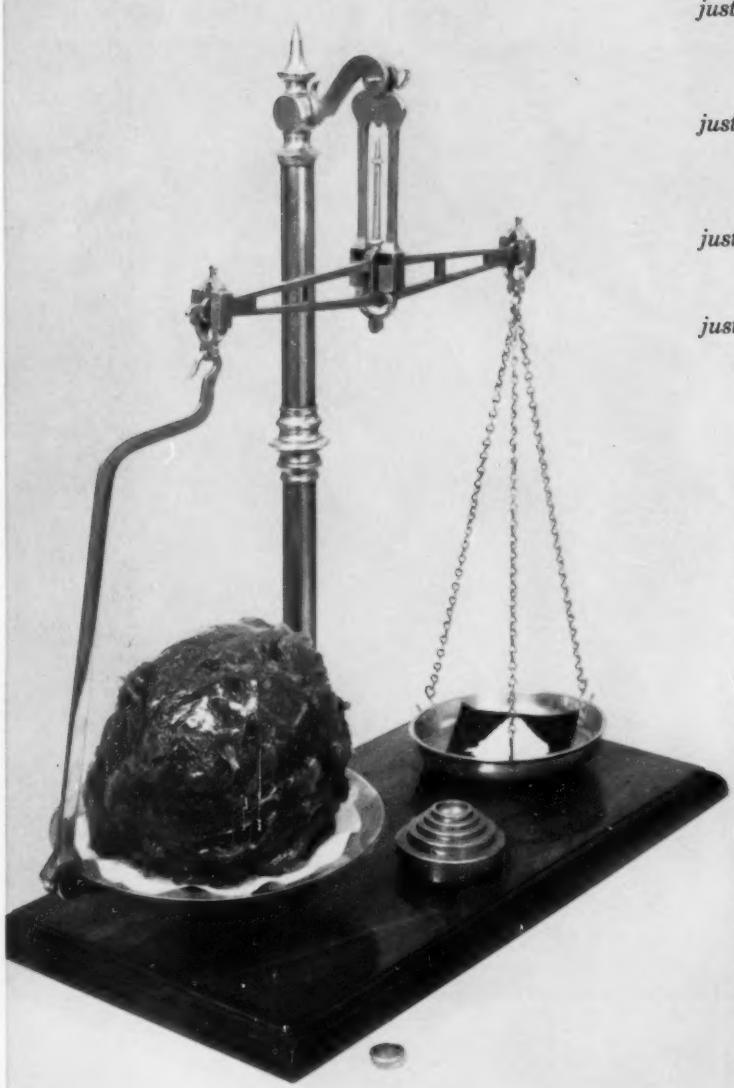
THE THINGS YOU CAN DO WITH A LITTLE LITHIUM



just one pound of lithium hydroxide is all that's needed to make one hundred pounds of multi-purpose grease.

just one pound of finely divided metallic lithium is catalyst enough for one thousand pounds of synthetic rubber.

just one pound of metallic lithium degasifies one thousand pounds of molten copper.

just one pound of lithium hydride releases fifty cubic feet of hydrogen.

It's not so much *the things you can do with lithium* . . . as it is *how little lithium you need to do them.* Present day industrial applications require such small quantities of the metal that today's proven reserves are more than adequate to take care of all foreseeable needs. And even if lithium uses expand faster than their present amazing rate, it's reassuring to note that Foote Mineral, with the largest operating deposits in the United States, is still proving new reserves every day.

If you're interested in how a little of the right lithium chemical might go a long way in improving your operations, we'll be happy to discuss lithium chemistry with you at your convenience. Or, write now for a brief working rundown in "The Physical and Chemical Properties of Lithium Compounds" to Foote Mineral Company, 460 Eighteen West Chelten Building, Philadelphia 44, Penna.

Foote
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RESEARCH LABORATORIES: Berwyn, Pennsylvania.

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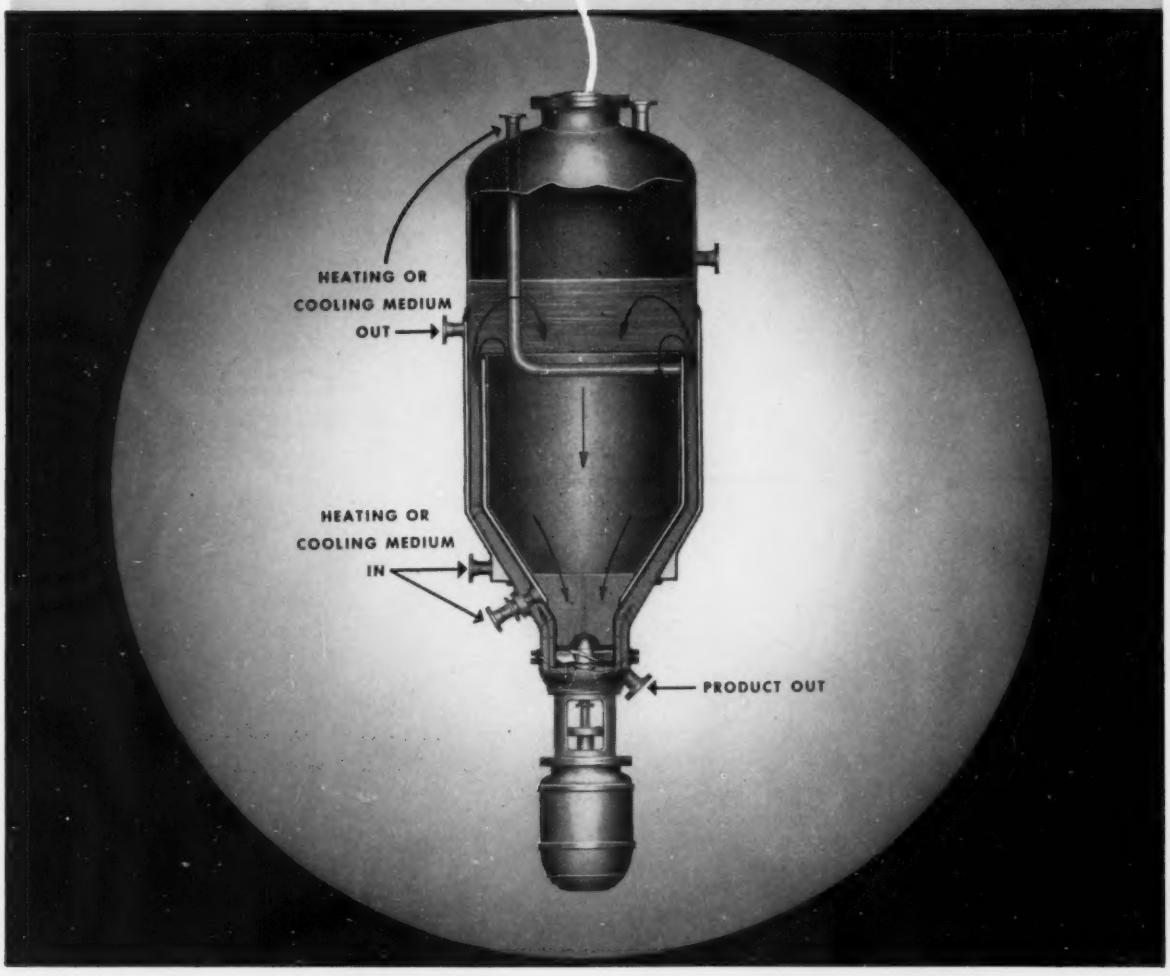
The STRATCO contactor



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Adaptable to existing plants to improve quality of product and reduce manufacturing cost. A vital part of all complete grease plant installations.

Used for complete saponification of all soaps with very short time cycles, resulting in less soap requirement, simplified laboratory control and reduced man hours of operation. Also employed advantageously for sulphurization of oils. Available in capacities from 2 gallon laboratory units to 2300 gallon commercial sizes.

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